

# PICO-APL4

## Reliability Prediction Report (MTBF)

Summary	Failure Rate: 5211.183865 MTBF: 191,895 Hours
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Issue date	QE Manager	Test Engineer
2018-05-24	KJ Wang	Max Chang

# Reliability Prediction (MTBF)

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**I . Model Name:** PICO-APL4

**II . Prediction Date:** May. 24th, 2018

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

**IV . Predicted by:** Max Chang

**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:**

PICO-APL4 (M/B: 9697APL417-D ):

- Failure Rate: 5211.183865
- MTBF: 191,895 Hours

**AAEON Reliability Prediction  
Summary**

**File Name:** PICO-APL4.rfp  
**Duty Cycle:** 100  
**Calculation Model:** Telcordia Issue 2  
**Method:** Method I Case 3

**Failure Rate:** 5211.183865  
**MTBF (hrs):** 191,895  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Assembly Name	Part Number	Ref Des	Quantity	Failure Rate	MTBF
PICO-APL4	9697APL417-D		1	5211.183865	191,895

**File Name:** PICO-APL4.rfp  
**Assembly:** 9697APL417-D  
**Ref Des:**  
**Description:**

**Failure Rate:** 5211.183865  
**MTBF (hrs):** 191,895  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
1050501004	Resistor	R255,R258,R261, R263,R271,R278, R280,R288,R293, R297,R344		2.547039	11	32049696.385471
1050501054	Resistor	R107,R206		2.547039	2	154078778.388085
1050501514	Resistor	R129,R136,R311		2.547039	3	107020754.986850
1050502004	Resistor	R111,R326,R331, R339,R340,R345, R348,R349		2.547039	8	43225424.698300
1050504764	Resistor	R412		2.547039	1	282340674.079668
1050508224	Resistor	R282		2.547039	1	282340674.079668
1050510004	Resistor	R104,R279,R445, R447,R87		2.547039	5	67008142.102588
1050510014	Resistor	R108,R116,R128,R13, R14,R145,R146,R193, R196,R221,R237, R346,R350,R352, R397		2.547039	15	23852782.943395
1050510024	Resistor	R184,R213,R298, R303,R319,R329,R33, R409		2.547039	8	43225424.698300
1050510034	Resistor	R110,R132,R183, R188,R194,R200, R201,R204,R211, R219,R292,R309, R378,R394,R430,R82		2.547039	16	22425139.809646
1050510504	Resistor	R60,R63		2.547039	2	154078778.388085
1050512104	Resistor	R88		2.547039	1	282340674.079668
1050517804	Resistor	R379		2.547039	1	282340674.079668
1050520004	Resistor	R112,R143,R84		2.547039	3	107020754.986850
1050520034	Resistor	R140,R179,R415, R432		2.547039	4	82309758.689546

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1050524909	Resistor	R428,R431,R433, R439		2.547039	4	82309758.689546
1050530004	Resistor	R380		2.547039	1	282340674.079668
1050530034	Resistor	R203		2.547039	1	282340674.079668
1050533034	Resistor	R101		2.547039	1	282340674.079668
1050533064	Resistor	R174,R182,R186, R190,R5		2.547039	5	67008142.102588
1050536514	Resistor	R218,R222,R239, R241		2.547039	4	82309758.689546
1050540204	Resistor	R142,R83,R85		2.547039	3	107020754.986850
1050547034	Resistor	R238,R420		2.547039	2	154078778.388085
1050549904	Resistor	R205		2.547039	1	282340674.079668
1050551004	Resistor	R425,R429		2.547039	2	154078778.388085
1050564914	Resistor	R269		2.547039	1	282340674.079668
1050580664	Resistor	R381		2.547039	1	282340674.079668
1050595314	Resistor	R402		2.547039	1	282340674.079668
1050701034	Resistor	R115,R123,R125, R133,R134,R147, R175,R178,R20,R21, R217,R242,R244, R245,R246,R247, R249,R259,R262, R273,R274,R275, R276,R277,R30,R306, R336,R337,R342,R36, R369,R370,R375, R376,R377,R395, R400,R41,R434,R435, R437,R443,R47,R51, R55,R64		2.547039	46	8085699.252497
1050720044	Resistor	R343		2.547039	1	282340674.079668
1050747014	Resistor	R220,R3,R328,R333, R356,R396,R399,R43		2.547039	8	43225424.698300
1050756004	Resistor	R317		2.547039	1	282340674.079668

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1053500282	Resistor	R393,R413		2.547039	2	154078778.388085
105A501539	Resistor	R127,R197		2.547039	2	154078778.388085
105A502039	Resistor	R100,R102,R 207, R436		2.547039	4	82309758.689546
105A502263	Resistor	R138,R252		2.547039	2	154078778.388085
105A506829	Resistor	R79		2.547039	1	282340674.079668
105A508233	Resistor	R442		2.547039	1	282340674.079668
105A510003	Resistor	R418,R419,R 421, R422		2.547039	4	82309758.689546
105A516043	Resistor	R212		2.547039	1	282340674.079668
105A524919	Resistor	R181,R392		2.547039	2	154078778.388085
105A560469	Resistor	R139		2.547039	1	282340674.079668
105A593123	Resistor	R208		2.547039	1	282340674.079668
105A700003	Resistor	R105,R109,R 195, R235,R236,R 285, R322,R37,R3 98,R40, R423,R426,R 427,R45, R58,R6,R74, R97		2.547039	18	20032117.836120
105A700009	Resistor	R1,R103,R11 3,R126, R151,R152,R 170, R177,R180,R 185,R19, R192,R227,R 243, R253,R264,R 266, R267,R270,R 272,R28, R283,R284,R 286, R289,R291,R 294, R295,R300,R 301, R305,R307,R 310, R313,R32,R3 21,R323, R325,R332,R 335,R34, R355,R38,R4 05,R406, R410,R414,R 42,R424, R44,		2.547039	63	5949421.035389

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105A701069	Resistor	R99		2.547039	1	282340674.079668
105A702229	Resistor	R371,R372,R373, R374,R39,R438,R444, R57		2.547039	8	43225424.698300
105A705139	Resistor	R10,R29		2.547039	2	154078778.388085
105A733009	Resistor	R2,R209,R210,R448, R449		2.547039	5	67008142.102588
105B504905	Resistor	R365,R366,R367, R388		2.547039	4	82309758.689546
105B524005	Resistor	R223,R224,R225, R226,R228,R229, R230,R231		2.547039	8	43225424.698300
105B530165	Resistor	R17,R18		2.547039	2	154078778.388085
105B700009	Resistor	R187,R240,R347, R357,R358,R440, R446,R450,R451, R452,R453,R454, R455,R456,R457, R486,R487,R62,R91, R92		2.547039	20	18104712.511396
105B700139	Resistor	R353,R70,R72,R90		2.547039	4	82309758.689546
105B701039	Resistor	R121,R124,R141, R148,R153,R154, R155,R158,R159, R160,R161,R162, R163,R167,R173, R176,R232,R234, R304,R334,R359, R362,R363,R384,R93, R94		2.547039	26	14061076.827148



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105B702225	Resistor	R150,R168,R169, R198,R199,R330, R416,R417		2.547039	8	43225424.698300
105B703605	Resistor	R458,R459,R460, R461,R462,R463, R464,R465,R466, R467,R468,R469, R470,R471,R472, R473,R474,R475, R476,R477,R478, R479,R480,R481, R482,R483,R484, R485		2.547039	28	13089488.559853
105B704725	Resistor	R106,R117,R119, R122,R144,R149, R281,R290,R299, R360,R488		2.547039	11	32049696.385471
105B710009	Resistor	R368,R389,R390		2.547039	3	107020754.986850
105B710039	Resistor	R118,R130,R164, R189,R254,R265, R338,R35,R59,R65, R95		2.547039	11	32049696.385471

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1121501690	Capacitor	C106,C108,C112,C124,C14,C155,C157,C158,C168,C181,C184,C185,C189,C195,C198,C20,C204,C205,C207,C208,C210,C211,C213,C216,C227,C228,C23,C234,C237,C24,C254,C255,C257,C26,C263,C270,C277,C284,C285,C289,C292,C293,C296,C297,C299,C3,C30,C302,C304,C308		1.128806	83	10388437.251679
1121533480	Capacitor	C401		1.128806	1	704977644.692287
1124418090	Capacitor	C121,C141		1.128806	2	375289731.076049
1124433690	Capacitor	C18		1.128806	1	704977644.692287
1124522290	Capacitor	C287,C288		1.128806	2	375289731.076049
1124533190	Capacitor	C408		1.128806	1	704977644.692287
1124533280	Capacitor	C192,C315		1.128806	2	375289731.076049
1124547290	Capacitor	C176,C282		1.128806	2	375289731.076049
1129601080	Capacitor	C125,C238,C384		1.128806	3	257514172.353070
1129610080	Capacitor	C191,C214		1.128806	2	375289731.076049
1129701790	Capacitor	C230,C272,C273,C274,C275,C366,C37,C404		1.128806	8	101746760.035398
1129710090	Capacitor	C180,C188,C239		1.128806	3	257514172.353070
1129710390	Capacitor	C140,C294,C331		1.128806	3	257514172.353070
1129722091	Capacitor	C354,C355,C362,C367		1.128806	4	196873384.410843
1189615154	Capacitor	TC3		1.128806	1	704977644.692287

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118C6331B1	Capacitor	TC1,TC2		1.128806	2	375289731.076049
11A4410194	Capacitor	C145,C146,C223, C229,C231		1.128806	5	159367490.199266
11C2522480	Capacitor	C383		1.128806	1	704977644.692287
11C4510480	Capacitor	C139,C43,C50		1.128806	3	257514172.353070
11C4522191	Capacitor	C232		1.128806	1	704977644.692287
11E1501040	Capacitor	C136,C137,C150, C152,C199,C219, C220,C221,C276, C400,C5,C6, C70,C82, C93,C96		1.128806	16	52112480.802928
11E2501080	Capacitor	C68		1.128806	1	704977644.692287
11E2510010	Capacitor	C225,C235,C236, C335,C378,C393		1.128806	6	133979725.056342
11E2610032	Capacitor	C186,C406,C407		1.128806	3	257514172.353070
11E2622011	Capacitor	C153,C167,C28,C281, C283,C31,C327,C330, C338		1.128806	9	90863428.080946
11E4510440	Capacitor	C224,C27,C336,C36, C360,C382,C392, C394,C405,C9		1.128806	10	82101057.548118

**Reliability Prediction  
Summary**

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11E9510490	Capacitor	C10,C101,C11,C147,C171,C172,C177,C182,C183,C19,C194,C196,C200,C202,C203,C217,C248,C252,C253,C258,C259,C290,C328,C329,C334,C337,C342,C343,C344,C345,C349,C350,C351,C352,C353,C356,C359,C363,C364,C365,C368,C369,C370,C371,C372,C375,C376,C377,C38		1.128806	56	15308283.020186
11E9547680	Capacitor	C305,C306		1.128806	2	375289731.076049
11E9622052	Capacitor	C226		1.128806	1	704977644.692287

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11E9622080	Capacitor	C113,C114,C126, C127,C128,C129, C130,C144,C151, C159,C163,C169, C170,C173,C178, C262,C286,C332, C333,C379,C380, C381,C386,C42,C44, C45,C46,C47,C48, C49,C51,C52,C53, C54,C56,C58,C59, C62,C63,C64,C65, C66,C67,C71,C73, C74,C75,C77,C78, C80,C81,C97		1.128806	52	16465757.036261
11E9647690	Capacitor	C201,C206,C222, C271,C298,C311, C361,C57		1.128806	8	101746760.035398

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11EA501050	Capacitor	C1,C100,C102,C103,C104,C105,C107,C109,C110,C111,C115,C116,C117,C118,C12,C120,C122,C123,C13,C131,C132,C133,C134,C138,C142,C143,C148,C149,C15,C154,C156,C16,C161,C164,C165,C17,C174,C175,C193,C2,C215,C22,C240,C241,C242,C244,C245,C246,C247,C249,C		1.128806	68	12644624.424143
11EA510390	Capacitor	C187,C190,C209,C212,C218,C374		1.128806	6	133979725.056342
11EA610040	Capacitor	C21,C243,C25,C250,C251,C261,C29,C291,C310,C32,C33,C34,C35		1.128806	13	63728475.410842
11EA610120	Capacitor	C264,C265,C40,C41		1.128806	4	196873384.410843
11EA647010	Capacitor	C160,C162,C166		1.128806	3	257514172.353070
11EB522640	Capacitor	C256,C301,C316		1.128806	3	257514172.353070
11EB610041	Capacitor	C233,C303,C314,C320,C398		1.128806	5	159367490.199266
11EB622030	Capacitor	C319,C322,C357,C358		1.128806	4	196873384.410843
11EB647021	Capacitor	C385,C387,C390		1.128806	3	257514172.353070
121110106Z	Inductor	L6		4.944252	1	154760964.143460

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121110226Y	Inductor	L5		4.944252	1	154760964.143460
1211102272	Inductor	L8		4.944252	1	154760964.143460
1211104777	Inductor	L2,L3,L4		4.944252	3	57363284.375370
1211104779	Inductor	L1,L7		4.944252	2	83201062.149749
1212308054	Inductor	FB3		4.944252	1	154760964.143460
12123A000E	Inductor	FB2		4.944252	1	154760964.143460
1214109000	Inductor	CH1,CH10,C H2,CH9		4.944252	4	43912872.424775
1214109004	Inductor	CH11,CH12,C H3,CH4		4.944252	4	43912872.424775
12310025A5	Miscellaneous	Y4,Y5		19.200000	2	8854051.752197
12310192A0	Miscellaneous	Y2		19.200000	1	23844262.770939
1231332726	Miscellaneous	Y1		19.200000	1	23844262.770939
12330024A1	Miscellaneous	Y3		19.200000	1	23844262.770939
1301013041	Inductor	D8		14.982581	1	47723799.025899
1301400642	Inductor	D3		14.982581	1	47723799.025899
1301793040	Inductor	D1,D2,D4,D5 ,D6		14.982581	5	11357516.895960
1304001340	Optical Device	LED2		79.003355	1	6497172.749112
1304101340	Optical Device	LED3		79.003355	1	6497172.749112
1304300140	Optical Device	LED1		79.003355	1	6497172.749112
130505ESD0	Semiconductor	U13,U14,U15 ,U16		7.793411	4	26989084.126235
1310390413	Semiconductor	Q12,Q14		22.463360	2	17315095.066101
1311390610	Semiconductor	Q20,Q9		22.463360	2	17315095.066101
1315013810	Semiconductor	Q28		22.463360	1	31642600.748419
1315036600	Semiconductor	Q7		22.463360	1	31642600.748419
1315200312	Semiconductor	Q25		22.463360	1	31642600.748419
1315443512	Semiconductor	Q23,Q24		22.463360	2	17315095.066101
1315700216	Semiconductor	Q5		22.463360	1	31642600.748419
1315720010	Semiconductor	Q18,Q2		22.463360	2	17315095.066101
1315EM6K10	Semiconductor	Q1,Q10,Q11, Q13,Q15, Q16,Q17,Q2 1,Q22, Q26,Q27,Q2 9,Q3,Q4, Q6,Q8		22.463360	16	2533798.883137
1430006710	Integrated Circuit	U40		43.803003	1	11739202.588727
1430097420	Integrated Circuit	U12,U42		43.803003	2	6834791.244197
1430Q86360	Integrated Circuit	U22		43.803003	1	11739202.588727
1436509421	Integrated Circuit	U4		43.803003	1	11739202.588727
1440002130	Integrated Circuit	U2		43.803003	1	11739202.588727
1440033650	Integrated Circuit	U35		43.803003	1	11739202.588727
1440818040	Integrated Circuit	U7		43.803003	1	11739202.588727
1440N42000	Integrated Circuit	U32		21.706765	1	23689035.791249
1448111GC0	Integrated Circuit	U36,U37		43.803003	2	6834791.244197
1462001282	Integrated Circuit	U38		11.063278	1	58231413.220643

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Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
1468MT41K0	Integrated Circuit	U25,U26,U27,U28		43.803003	4	3879156.910661
1469KS32G0	Integrated Circuit	U30		43.803003	1	11739202.588727
149F759140	Integrated Circuit	U33,U8		43.803003	2	6834791.244197
149TB01040	Integrated Circuit	U10		43.803003	1	11739202.588727
149TS01040	Integrated Circuit	U9		43.803003	1	11739202.588727
14S3104500	Integrated Circuit	U17,U18,U19,U34, U39		43.803003	5	3214211.402100
14S3E00100	Integrated Circuit	U31		43.803003	1	11739202.588727
14S4751100	Integrated Circuit	U3		43.803003	1	11739202.588727
14S4814380	Integrated Circuit	U1		43.803003	1	11739202.588727
14S5912300	Integrated Circuit	U23		26.018600	1	25551442.237972
14S5A00821	Integrated Circuit	U5,U6		26.018600	2	14194252.866846
14S5A30601	Integrated Circuit	U11,U41,U43		26.018600	3	9949526.289768
14S911P600	Integrated Circuit	U29		26.018600	1	25551442.237972
14S9811500	Integrated Circuit	U24		26.018600	1	25551442.237972
1540710280	Resistor	RP8		9.971436	1	51606907.671214
1652602105	Connection	CN17		16.184835	1	35685591.360212
1652814205	Connection	CN13,CN14		16.184835	2	20390152.380746
165300310G	Connection	JP1,JP2		16.184835	2	20390152.380746
165300320D	Connection	CN7		16.184835	1	35685591.360212
1653300108	Connection	JP2(2-3)		16.184835	1	35685591.360212
165330010E	Connection	JP1(1-2)		16.184835	1	35685591.360212
1653505200	Connection	CN3		16.184835	1	35685591.360212
1654207533	Connection	CN4		16.184835	1	35685591.360212
1654207536	Connection	CN5		16.184835	1	35685591.360212
165440193A	Connection	CN11		16.184835	1	35685591.360212
1654801832	Connection	CN15		16.184835	1	35685591.360212
1654907009	Connection	CN8		16.184835	1	35685591.360212
1655302025	Connection	CN10		16.184835	1	35685591.360212
1655804130	Connection	CN20,CN21		16.184835	2	20390152.380746
1655807030	Connection	CN9		16.184835	1	35685591.360212
1655812130	Connection	CN22		16.184835	1	35685591.360212
1655902034	Connection	CN12		16.184835	1	35685591.360212
1655909035	Connection	CN1,CN2		16.184835	2	20390152.380746
175011301C	Miscellaneous	CN12		306.000000	1	1681683.006787
1752000501	Miscellaneous	FS1		2.400000	1	254626042.602335
1752001603	Miscellaneous	FS2		2.400000	1	254626042.602335
1752004600	Miscellaneous	FS3		2.400000	1	254626042.602335