

# AEC-6401

## Reliability Prediction Report (MTBF)

Summary	Failure Rate: 13549.721173 ppm MTBF: 73,802 Hours
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Issue date	Approval	Test Engineer
2013/05/02	Tom Lin	Jack Huang

# Reliability Prediction (MTBF)

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**I . Model Name:** AEC-6401

**II . Prediction Date:** May. 03, 2013

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

**IV . Predicted by:** Jack Huang

**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:**

TKS-G21-QM77B (9697QM7758-D):

- Failure Rate: 13549.721173 ppm
- MTBF: 73,802 Hours

**AAEON Reliability Prediction  
Summary**

**File Name:** AEC-6401.rfp  
**Duty Cycle:** 100  
**Calculation Model:** Telcordia Issue 2  
**Method:** Method I Case 3

**Failure Rate:** 13549.721173  
**MTBF (hrs):** 73,802  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Assembly Name	Part Number	Ref Des	Quantity	Failure Rate	MTBF
System	System		1	13549.721173	73,802

**File Name:** AEC-6401.rfp  
**Assembly:** System  
**Ref Des:**  
**Description:**

**Failure Rate:** 13549.721173  
**MTBF (hrs):** 73,802  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
1050500334	Resistor	R5		2.547039	1	282340674.079668
1050501004	Resistor	R186,R187,R319		2.547039	3	107020754.986850
1050503934	Resistor	R419		2.547039	1	282340674.079668
1050504724	Resistor	R446		2.547039	1	282340674.079668
1050504764	Resistor	R401		2.547039	1	282340674.079668
1050505124	Resistor	R335		2.547039	1	282340674.079668
1050505134	Resistor	R139,R140,R155		2.547039	3	107020754.986850
1050507524	Resistor	R164,R397,R461		2.547039	3	107020754.986850
1050510034	Resistor	R221,R240,R281,R310,R318,R323,R324,R329,R330,R333,R339		2.547039	11	32049696.385471
1050511009	Resistor	R154,R383		2.547039	2	154078778.388085
1050512104	Resistor	R170		2.547039	1	282340674.079668
1050512114	Resistor	R395		2.547039	1	282340674.079668
1050513034	Resistor	R136,R148,R166		2.547039	3	107020754.986850
1050522114	Resistor	R146		2.547039	1	282340674.079668
1050524004	Resistor	R229		2.547039	1	282340674.079668
1050524904	Resistor	R3,R42		2.547039	2	154078778.388085
1050531614	Resistor	R116		2.547039	1	282340674.079668
1050537464	Resistor	R400,R402,R507		2.547039	3	107020754.986850
1050539264	Resistor	R135,R344,R345,R73,R81,R83,R87		2.547039	7	48991237.965885
1050561934	Resistor	R2		2.547039	1	282340674.079668
1050568034	Resistor	R467		2.547039	1	282340674.079668
1050569824	Resistor	R257		2.547039	1	282340674.079668
1050590964	Resistor	R16,R19,R24,R33		2.547039	4	82309758.689546
1050703334	Resistor	R141		2.547039	1	282340674.079668
1050756004	Resistor	R30,R31,R312		2.547039	3	107020754.986850
105A500139	Resistor	R115,R193,R194,R197,R198,R202,R230,R231,R320,R326		2.547039	10	35079934.879747
105A500239	Resistor	R175,R354,R393,R438		2.547039	4	82309758.689546

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105A501039	Resistor	R120,R121,R152, R153,R157,R174, R216,R270,R360, R394,R396,R420, R460,R466		2.547039	14	25477245.255648
105A501413	Resistor	R196		2.547039	1	282340674.079668
105A501539	Resistor	R247,R459		2.547039	2	154078778.388085
105A502039	Resistor	R290,R493		2.547039	2	154078778.388085
105A503309	Resistor	R234,R392		2.547039	2	154078778.388085
105A504763	Resistor	R415		2.547039	1	282340674.079668
105A505109	Resistor	R124,R125,R126, R398,R399,R425		2.547039	6	56573956.677649
105A507509	Resistor	R123		2.547039	1	282340674.079668
105A510009	Resistor	R122,R176,R177, R332,R384,R435, R436,R440,R441, R465		2.547039	10	35079934.879747
105A510223	Resistor	R504		2.547039	1	282340674.079668
105A512039	Resistor	R165		2.547039	1	282340674.079668
105A515034	Resistor	R423,R482		2.547039	2	154078778.388085
105A520033	Resistor	R483		2.547039	1	282340674.079668
105A522669	Resistor	R179,R43		2.547039	2	154078778.388085
105A523713	Resistor	R390		2.547039	1	282340674.079668
105A524919	Resistor	R18,R470		2.547039	2	154078778.388085
105A527403	Resistor	R183		2.547039	1	282340674.079668
105A533269	Resistor	R180		2.547039	1	282340674.079668
105A534823	Resistor	R506		2.547039	1	282340674.079668
105A549969	Resistor	R416,R424		2.547039	2	154078778.388085
105A551119	Resistor	R429		2.547039	1	282340674.079668
105A553629	Resistor	R163,R211		2.547039	2	154078778.388085
105A556269	Resistor	R449		2.547039	1	282340674.079668
105A560469	Resistor	R289,R296		2.547039	2	154078778.388085
105A562034	Resistor	R422		2.547039	1	282340674.079668
105A568103	Resistor	R99		2.547039	1	282340674.079668
105A597613	Resistor	R261		2.547039	1	282340674.079668

File Name: AEC-6401.rfp

Assembly: System

Ref Des:

Description:

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Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
105A700003	Resistor	R144,R162,R191, R192,R228,R238, R256,R282,R284, R372,R373,R404, R431,R484		2.547039	14	25477245.255648
105A700009	Resistor	R103,R104,R105, R106,R107,R108, R109,R110,R111, R112,R113,R117, R118,R12,R127,R130, R137,R150,R156, R159,R160,R167, R169,R195,R206,R21, R25,R277,R291,R313, R316,R351,R407, R408,R411,R412, R421,R437,R439, R443,R444,R450,		2.547039	62	6043178.840887
105A700139	Resistor	R11,R13,R134,R14, R149,R184,R205, R249,R250,R251, R268,R271,R288, R293,R295,R325, R336,R375,R381,R41, R47,R473,R501,R51, R55,R62,R64,R71, R74,R86		2.547039	30	12244464.256771

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105A701039	Resistor	R10,R101,R114,R133,R172,R255,R260,R262,R265,R278,R301,R302,R305,R317,R327,R338,R348,R359,R362,R364,R365,R366,R409,R414,R430,R44,R458,R46,R472,R474,R479,R488,R489,R503,R53,R8,R84,R85,R88,R89		2.547039	40	9263254.152485
105A701059	Resistor	R102,R158,R227,R283,R50,R94		2.547039	6	56573956.677649
105A701069	Resistor	R294		2.547039	1	282340674.079668
105A702229	Resistor	R128,R142,R151,R213,R214,R218,R219,R300,R311,R322,R334,R355,R405,R410,R417,R428,R447,R477,R494,R495,R496,R497		2.547039	22	16518584.576317
105A702263	Resistor	R131,R232,R237,R469,R500		2.547039	5	67008142.102588
105A702269	Resistor	R457		2.547039	1	282340674.079668
105A704709	Resistor	R298,R304,R78		2.547039	3	107020754.986850



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105A704729	Resistor	R203,R204,R220, R239,R241,R245, R248,R263,R264, R272,R273,R276, R306,R314,R315,R34, R341,R342,R343,R35, R350,R353,R357, R370,R39,R48,R63, R65,R66,R67,R68, R69,R7,R70,R75,R76, R80,R9		2.547039	38	9736567.158302
105A704739	Resistor	R168		2.547039	1	282340674.079668
105A705139	Resistor	R143,R171,R32,R371, R4		2.547039	5	67008142.102588
105A705629	Resistor	R40		2.547039	1	282340674.079668
105A708229	Resistor	R15,R17,R27,R28, R308,R331,R54,R56, R57,R58,R59,R60		2.547039	12	29507083.749401
105A710039	Resistor	R129,R200,R222, R223,R258,R279, R337,R376,R403, R413,R481		2.547039	11	32049696.385471
105A722003	Resistor	R286,R456		2.547039	2	154078778.388085
105A722009	Resistor	R1		2.547039	1	282340674.079668
105A733009	Resistor	R208,R225,R243, R246		2.547039	4	82309758.689546
105A739039	Resistor	R280		2.547039	1	282340674.079668
105A747039	Resistor	R212		2.547039	1	282340674.079668
106B501032	Resistor	RT1		7.724580	1	66247589.526685

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Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
1121501691	Capacitor	C100,C102,C104, C105,C106,C107, C108,C109,C111,C112, C116,C117,C118, C119,C12,C120,C122, C124,C14,C142,C143, C145,C147,C15,C153, C154,C16,C162,C163, C164,C166,C168, C170,C172,C189, C190,C194,C199,C20, C200,C201,C207, C219,C221,C223,		1.128806	117	7400742.265745
1122701680	Capacitor	C144,C347		1.128806	2	375289731.076049
1124410191	Capacitor	C273,C348,C349,C77		1.128806	4	196873384.410843
1124418090	Capacitor	C184,C192,C57,C58		1.128806	4	196873384.410843
1124418190	Capacitor	C359,C360,C361, C362,C363,C364, C365,C366,C367, C368,C369,C371, C372,C375		1.128806	14	59316298.011235
1124427091	Capacitor	C13,C18,C50,C54, C55		1.128806	5	159367490.199266
1124533190	Capacitor	C324		1.128806	1	704977644.692287
1124533280	Capacitor	C241,C281,C374		1.128806	3	257514172.353070
1124547190	Capacitor	C1,C271,C275,C279, C346		1.128806	5	159367490.199266
1129522790	Capacitor	C128		1.128806	1	704977644.692287
1129610260	Capacitor	C171		1.128806	1	704977644.692287

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Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
1129622690	Capacitor	C115,C139,C149, C277,C318,C322, C325,C327,C334,C56, C93		1.128806	11	74892583.279796
1129701791	Capacitor	C130,C165,C2,C21, C236,C351,C352, C355,C356,C38,C39, C43,C45		1.128806	13	63728475.410842
1129710091	Capacitor	C180		1.128806	1	704977644.692287
1129710391	Capacitor	C132		1.128806	1	704977644.692287
1181647080	Capacitor	TC7		4.744484	1	159663026.715137
118961018A	Capacitor	TC14		4.744484	1	159663026.715137
1189615151	Capacitor	TC13,TC15		4.744484	2	86049450.747498
1189615154	Capacitor	TC8		4.744484	1	159663026.715137
1189622153	Capacitor	TC12,TC6		4.744484	2	86049450.747498
1189622154	Capacitor	TC2,TC5,TC9		4.744484	3	59399119.141203
1189633151	Capacitor	TC17,TC3,TC4		4.744484	3	59399119.141203
1189922181	Capacitor	TC1		4.744484	1	159663026.715137
11C2510480	Capacitor	C185		1.128806	1	704977644.692287
11C4515190	Capacitor	C59		1.128806	1	704977644.692287
11C4522290	Capacitor	C123,C332,C353,C65		1.128806	4	196873384.410843
11E1510050	Capacitor	C155,C175,C176, C258,C260,C330, C336,C343,C344,C9, C91		1.128806	11	74892583.279796
11E1522680	Capacitor	C63,C71		1.128806	2	375289731.076049
11E2501080	Capacitor	C137		1.128806	1	704977644.692287
11E2522060	Capacitor	C131,C186,C19,C53		1.128806	4	196873384.410843
11E2601050	Capacitor	C148,C257,C496		1.128806	3	257514172.353070

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Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
11E9501091	Capacitor	C121,C125,C126, C127,C140,C169, C174,C178,C179, C182,C183,C187, C188,C191,C193, C195,C198,C209, C215,C218,C224, C268,C278,C282, C285,C289,C292, C294,C295,C296, C297,C298,C301, C302,C303,C304, C305,C306,C308,		1.128806	54	15865848.114680
11E9510050	Capacitor	C133,C230,C24,C293		1.128806	4	196873384.410843
11E9610080	Capacitor	C113,C114,C134, C135,C136,C138, C146,C17,C177,C208, C217,C232,C235, C253,C255,C261, C262,C263,C264, C291,C310,C36,C48, C495,C51,C60,C67, C73,C80,C84,C95, C96		1.128806	32	26512863.286539

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11E9622080	Capacitor	C103,C141,C181, C247,C259,C280, C286,C287,C288, C315,C333,C37,C497, C498,C92		1.128806	15	55479656.844874
11E9647680	Capacitor	C129,C173,C283, C284,C300		1.128806	5	159367490.199266
11E9647690	Capacitor	C342		1.128806	1	704977644.692287
1211100113	Inductor	L7,L8,L9		4.944252	3	57363284.375370
1211100160	Inductor	L10		4.944252	1	154760964.143460
121110156F	Inductor	L2		4.944252	1	154760964.143460
121110156M	Inductor	L1		4.944252	1	154760964.143460
121110226H	Inductor	L3	47.7	10.797956	1	70863151.404854
121110336W	Inductor	L4		4.944252	1	154760964.143460
121110476Q	Inductor	L6		4.944252	1	154760964.143460
1211105679	Inductor	L5	50.8	11.277765	1	67848299.315139
1212306030	Inductor	FB1,FB2,FB22,FB25, FB28,FB30,FB4,FB5, FB6,FB7,FB8,FB9		4.944252	12	15520616.516984
1212306031	Inductor	FB24		4.944252	1	154760964.143460
1212308054	Inductor	FB27,FB29,FB32		4.944252	3	57363284.375370
1214309008	Inductor	CH2,CH3,CH8,CH9		4.944252	4	43912872.424775
1214309009	Inductor	CH4,CH5,CH6,CH7		4.944252	4	43912872.424775
123132505D	Miscellaneous	Y2,Y4		19.200000	2	8854051.752197
1231327053	Miscellaneous	Y3		19.200000	1	23844262.770939
1231332722	Miscellaneous	Y1		19.200000	1	23844262.770939
1233348053	Miscellaneous	OSC1		19.200000	1	23844262.770939
1301005443	Semiconductor	D3		7.793411	1	92807310.010983
1301005444	Semiconductor	D1,D13,D20, D21,D22		7.793411	5	21965031.404253
1301053040	Semiconductor	D27		7.793411	1	92807310.010983
1304001340	Optical Device	D14		79.003355	1	6497172.749112
1304101340	Optical Device	D15		79.003355	1	6497172.749112
1304300140	Optical Device	D2,D32		79.003355	2	3783722.582110

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1305080040	Semiconductor	D10,D11,D12 ,D28, D29,D30,D31 ,D6,D7, D8,D9		7.793411	11	10495888.688121
1309009940	Semiconductor	D23,D24		7.793411	2	50578095.223398
1310390413	Semiconductor	Q12,Q13,Q1 4,Q25, Q26,Q6		22.463360	6	6378891.324740
1311390612	Semiconductor	Q24,Q29,Q3 4		22.463360	3	12043329.789539
1314880010	Semiconductor	Q10		22.463360	1	31642600.748419
1315230511	Semiconductor	Q15,Q36,Q9		22.463360	3	12043329.789539
1315443710	Semiconductor	Q4,Q7		22.463360	2	17315095.066101
1315444710	Semiconductor	Q21		22.463360	1	31642600.748419
1315700216	Semiconductor	Q16,Q2,Q22, Q23,Q27, Q28,Q3,Q35, Q37,Q38, Q39,Q40,Q4 1,Q5,Q8		22.463360	15	2694825.052176
1315762010	Semiconductor	Q1,Q11,Q32		22.463360	3	12043329.789539
1315831310	Semiconductor	Q18	45.9	22.677821	1	31343360.904482
1315970211	Semiconductor	U29,U31		22.463360	2	17315095.066101
1440N26000	Integrated Circuit	U9	37.6	95.291566	1	5396199.797629
14S2321900	Integrated Circuit	U23		43.803003	1	11739202.588727
14S2432600	Integrated Circuit	U11		43.803003	1	11739202.588727
14S3003700	Integrated Circuit	T1		43.803003	1	11739202.588727
14S3052400	Integrated Circuit	U33,U34		43.803003	2	6834791.244197
14S3121600	Integrated Circuit	U21		43.803003	1	11739202.588727
14S3433900	Integrated Circuit	U8	45.9	735.357368	1	699268.616784
14S3816700	Integrated Circuit	U10	43.4	642.890454	1	799844.399689
14S3973100	Integrated Circuit	U7	55.8	1229.200545	1	418330.704037
14S4001000	Integrated Circuit	U3	52.4	1033.702762	1	497446.991712
14S4021301	Integrated Circuit	U2	47.7	809.102398	1	635534.303582
14S4081110	Integrated Circuit	U13		43.803003	1	11739202.588727
14S4121602	Integrated Circuit	U32		43.803003	1	11739202.588727
14S4180100	Integrated Circuit	U5	44.8	693.302501	1	741685.380707
14S4519500	Integrated Circuit	U17		43.803003	1	11739202.588727
14S4811102	Integrated Circuit	U22		43.803003	1	11739202.588727
14S4814380	Integrated Circuit	U35	46.6	763.290898	1	673678.057354
14S4814380	Integrated Circuit	U36		43.803003	1	11739202.588727
14S5912300	Integrated Circuit	U12		26.018600	1	25551442.237972
14S5A00704	Integrated Circuit	U18		26.018600	1	25551442.237972
14S5A00821	Integrated Circuit	U14,U20,U25		26.018600	3	9949526.289768
14S62PCV01	Integrated Circuit	U6		11.063278	1	58231413.220643
14S9341101	Integrated Circuit	U16	44.7	689.587976	1	745680.532429
14S9811500	Integrated Circuit	U15		26.018600	1	25551442.237972

**File Name:** AEC-6401.rfp  
**Assembly:** System  
**Ref Des:**  
**Description:**

**Failure Rate:** 13549.721173  
**MTBF (hrs):** 73,802  
**Temperature:** 30  
**Environment:** GF, GU - Ground Fixed, Uncontrolled

Part Number	Category	Ref Des	Tem.Rise	Unit Failure Rate	Quantity	MTBF,Unit
1540710382	Resistor	RP2,RP3		9.971436	2	30043399.401299
1540775081	Resistor	RN2		9.971436	1	51606907.671214
1540782282	Resistor	RP4,RP5,RP6,RP7		9.971436	4	17049357.262242
1601613200	Optical Device	PW1		79.003355	1	6497172.749112
16515A2994	Connection	DIMM1		16.184835	1	35685591.360212
1652503209	Connection	J12		16.184835	1	35685591.360212
1652808200	Connection	CN12,CN20,CN21,CN22		16.184835	4	11344857.509064
1653003101	Connection	JP2,JP3,JP5,JP6		16.184835	4	11344857.509064
1653212100	Connection	CN10		16.184835	1	35685591.360212
1653300102	Connection	JP6(2-3)		16.184835	1	35685591.360212
1653300107	Connection	JP3(2-3),JP5(2-3)		16.184835	2	20390152.380746
1653300108	Connection	JP2(1-2)		16.184835	1	35685591.360212
1654020004	Connection	CN15		16.184835	1	35685591.360212
1654226303	Connection	PCIE1A		16.184835	1	35685591.360212
1654401930	Connection	CN17		16.184835	1	35685591.360212
165480430A	Connection	CN23,CN24,CN25,CN26		16.184835	4	11344857.509064
1655305020	Connection	CN18		16.184835	1	35685591.360212
1655902030	Connection	BAT1A,CN8,CN9		16.184835	3	14515880.849373
1655905032	Connection	CN11		16.184835	1	35685591.360212
1655906032	Connection	CN27,CN28		16.184835	2	20390152.380746
175011901M	Miscellaneous	BAT1B		306.000000	1	1681683.006787
1752001603	Miscellaneous	FS2		2.400000	1	254626042.602335