



**AAEON Technology INC.**  
ISO-9001/ISO-14001 Certified  
Industrial Automation PCs

# **SBC-456E**

## **Reliability Prediction Report**

### **(MTBF)**

**Release Date: Nov. 11, 1999**

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**Issue Stamp**

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**QA Manager**

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**QE Manager**

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**Test Engineer**



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Industrial Automation PCs

# **SBC-456E**


## **Reliability Prediction Report**

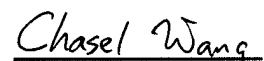
### **(MTBF)**

**Release Date: Nov. 11, 1999**

\_\_\_\_\_  
**Issue Stamp**

  
\_\_\_\_\_  
**QA Manager**

  
\_\_\_\_\_  
**QE Manager**

  
\_\_\_\_\_  
**Test Engineer**

# Reliability Prediction (MTBF)

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**I . Model Name: SBC-456E**

**II . Description: 486 Half-size CPU Card with LCD, Ethernet, & SSD**

**III . Prediction Date: Nov. 11, 1999**

**IV. Prediction Site: AAEON QE Dept.**

**V . Predicted by : Chasel Wang**

**VI.Equipment: Relex Ver.7.0 Visual Reliability Software**

**VII. Simulation Environment:**

- **Temperature: 25 degrees C**
- **Standard: Telcordia (Bellcore) Standard**

**VIII. Prediction Result:**

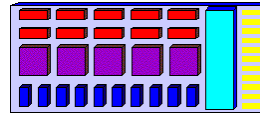
- **Failure Rate: 8.301356ppm**
- **MTBF: 120,462. hours**

**IX.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 multiplier is 1,000,000.**
- **MTBF**            **MTBF is always specified in hours.**

### AAEON Reliability Prediction Report

**Part Number** 9697456011  
**Reference Des**  
**Date** 11. 11, 1999  
**Environment** GF, GU - Ground Fixed, Uncontrolled  
**Temperature** 25.00

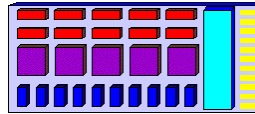


**Description** Top-level assembly  
**File Name** 456e.rpj  
**Time** 3:20 PM  
**Failure Rate** 8.301356  
**MTBF** 120,462

Assembly Name	Part Number	Model	Method	Environment	Duty Cycle	Qty	Failure Rate	MTBF
SBC-456E	9697456011	Bellcore	Method I Case 3	GF, GU - Ground Fixed,	100.00	1.00	8.301356	120,462

### AAEON Reliability Prediction Report

**Part Number** 9697456011  
**Reference Des**  
**Date** 11. 11, 1999  
**Environment** GF, GU - Ground Fixed, Uncontrolled  
**Temperature** 25.00

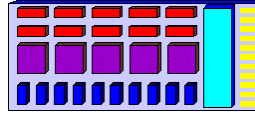


**Description** Top-level assembly  
**File Name** 456e.rpj  
**Time** 3:20 PM  
**Failure Rate** 8.301356  
**MTBF** 120,462

Part Number	Category	Location	Calculation Model	Quality	Tem. Rise	Failure Rate, Unit	Quantity	Failure Rate, %	Failure Rate	MTBF, Unit
101A700009	Resistor	R100,R114,R179,R164,R248,R296	Bellcore Issue 6	Level I		0.002268	7.00	.1912	0.015874	440974090.03
101A701009	Resistor	R103,R106,R109,R146,R218,R221-R225,R238,R239,R243,R250-253	Bellcore Issue 6	Level I		0.002268	14.00	.3824	0.031748	440974090.03
101A702209	Resistor	R242,R254,R255	Bellcore Issue 6	Level I		0.002268	3.00	.0820	0.006803	440974090.03
101A703309	Resistor	R2,R4,R6,R14,R18-22,R24,R135,R137,R140,R143,R147,R150-151,R154,R174-177,R303,R181-182,R187-188,R197-199,R207-209,R212,R223,R258,R274,R302	Bellcore Issue 6	Level I		0.002268	38.00	1.0381	0.086173	440974090.03
101A704729	Resistor	R12-13,R15,R23,R97,R101,R29-38-,R42-49,R102,R81-89,R116,R133,-R136,R141-142,R148-149,R152,R155-163,R167-170,R153,R172-173-,R180,R260,R226-229,R231-234,R244-247,R271,R294-295,R299,R300	Bellcore Issue 6	Level I		0.002268	77.00	2.1034	0.174613	440974090.03
101A710019	Resistor	R3,R27,R104-105,R235,R304-305	Bellcore Issue 6	Level I		0.002268	7.00	.1912	0.015874	440974090.03
101A710029	Resistor	R1,R9-11,R16-17,R25-26,R50-80,-R107,R91-96,R98,R108,R110-113,-R117-128,R200-205,R210,R211,R213-215,R217,R220,R224,R236,R241,R256-257,R262-263,R267-268-,R273,R275,R277,R279-283,R286--293	Bellcore Issue 6	Level I		0.002268	102.00	2.7864	0.231306	440974090.03
101A715009	Resistor	R129-132,R134,R264-266	Bellcore Issue 6	Level I		0.002268	8.00	.2185	0.018142	440974090.03
101A722009	Resistor	R206	Bellcore Issue 6	Level I		0.002268	1.00	.0273	0.002268	440974090.03
101A733009	Resistor	R90,R269-270,R272,R276,R278,R284-285,R297-298	Bellcore Issue 6	Level I		0.002268	10.00	.2732	0.022677	440974090.03
101A747009	Resistor	R185-186,R193	Bellcore Issue 6	Level I		0.002268	3.00	.0820	0.006803	440974090.03
101A756009	Resistor	R28	Bellcore Issue 6	Level I		0.002268	1.00	.0273	0.002268	440974090.03
1059511311	Resistor	R178	Bellcore Issue 6	Level I		0.002268	1.00	.0273	0.002268	440974090.03
1059520011	Resistor	R192	Bellcore Issue 6	Level I		0.002268	1.00	.0273	0.002268	440974090.03
105A528713	Resistor	R41	Bellcore Issue 6	Level I		0.002268	1.00	.0273	0.002268	440974090.03
105A571533	Resistor	R259	Bellcore Issue 6	Level I		0.002268	1.00	.0273	0.002268	440974090.03
1121701050	Capacitor	BC1,BC5-6,C6,BC12-13,BC15,C18-,BC18,BC27,BC32,BC35-36,BC39,-BC44-45,BC47-48,BC52-54,C56,B-C60-62,BC69,BC75,BC82,BC85	Bellcore Issue 6	Level I		0.002539	29.00	.8870	0.073632	393852661.82

### AAEON Reliability Prediction Report

**Part Number** 9697456011  
**Reference Des**  
**Date** 11. 11, 1999  
**Environment** GF, GU - Ground Fixed, Uncontrolled  
**Temperature** 25.00

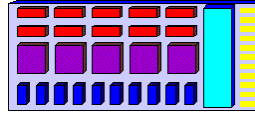


**Description** Top-level assembly  
**File Name** 456e.rpj  
**Time** 3:20 PM  
**Failure Rate** 8.301356  
**MTBF** 120,462

Part Number	Category	Location	Calculation Model	Quality	Tem. Rise	Failure Rate, Unit	Quantity	Failure Rate, %	Failure Rate	MTBF, Unit
1122701680	Capacitor	BC2-4,C7,BC7-11,BC14,BC16-17,-C19,C29,BC19-26,BC28-31,BC33--34,BC37-38,C41,BC40-43,BC46,C-49,BC48-51,BC55-59,C50,C57-58,-C60,C67,BC63-68,BC70-74,BC76--81,BC86-88,BC83-84,C76-77	Bellcore Issue 6	Level I		0.001598	75.00	1.4433	0.119817	625953979.55
1124501780	Capacitor	C30,C32,C40,C47,C51,C61-62	Bellcore Issue 6	Level I		0.001060	7.00	.0894	0.007422	943198589.05
1124510080	Capacitor	C1-5,C20,C31,C33-36,C38-39,C42--46,C52-55,C59	Bellcore Issue 6	Level I		0.001060	23.00	.2937	0.024385	943198589.05
1124518180	Capacitor	C8-16,C21-28,C74-75,C78-79	Bellcore Issue 6	Level I		0.001060	21.00	.2682	0.022265	943198589.05
1124522180	Capacitor	C37,C72-73	Bellcore Issue 6	Level I		0.001060	3.00	.0383	0.003181	943198589.05
1124547080	Capacitor	C63-65,C68-71	Bellcore Issue 6	Level I		0.001060	7.00	.0894	0.007422	943198589.05
1124547180	Capacitor	C17	Bellcore Issue 6	Level I		0.001060	1.00	.0128	0.001060	943198589.05
1141601090	Capacitor	TC30	Bellcore Issue 6	Level I		0.002539	1.00	.0306	0.002539	393852661.82
1141610050	Capacitor	TC2-7,TC10-11,TC13,TC15,TC19--29,TC31-33,TC35	Bellcore Issue 6	Level I		0.002357	25.00	.7098	0.058927	424256814.77
1141647080	Capacitor	TC9,TC16-18	Bellcore Issue 6	Level I		0.002357	4.00	.1136	0.009428	424256814.77
1142610060	Capacitor	TC34	Bellcore Issue 6	Level I		0.001587	1.00	.0191	0.001587	630075050.70
1149610180	Capacitor	TC1,TC8,TC12,TC14	Bellcore Issue 6	Level I		0.002636	4.00	.1270	0.010546	379304358.83
1212308050	Inductor	L2-7,L9-21	Bellcore Issue 6	Level I		0.002268	19.00	.5190	0.043086	440974090.03
1231120050	Miscellaneous	Y1	Bellcore Issue 6	Level I		0.150000	1.00	1.8069	0.150000	6666666.67
1231143180	Miscellaneous	X1	Bellcore Issue 6	Level I		0.150000	1.00	1.8069	0.150000	6666666.67
1300414800	Semiconductor	D2	Bellcore Issue 6	Level I		0.023881	1.00	.2877	0.023881	41874327.58
1304100200	Semiconductor	D1	Bellcore Issue 6	Level I		0.004877	1.00	.0587	0.004877	205063180.81
1305099140	Semiconductor	D3,D4,D5	Bellcore Issue 6	Level I		0.023881	3.00	.8630	0.071643	41874327.58
1310390410	Semiconductor	Q2	Bellcore Issue 6	Level I		0.005092	1.00	.0613	0.005092	196396984.17
1428274125	Integrated Circuit	U32	Bellcore Issue 6	Level I	10.00	0.101068	1.00	1.2175	0.101068	9894315.61
1440474004	Integrated Circuit	U14,U29	Bellcore Issue 6	Level I	20.00	0.153632	2.00	3.7014	0.307264	6509059.73
14D1605200	Semiconductor	Q1	Bellcore Issue 6	Level I		0.039802	1.00	.4795	0.039802	25124596.55
14D3000110	Integrated Circuit	U5	Bellcore Issue 6	Level I	4.00	0.042289	1.00	.5094	0.042289	23646557.51
14D3303100	Integrated Circuit	U2	Bellcore Issue 6	Level I	35.00	0.587018	1.00	7.0714	0.587018	1703525.41
14D4488600	Integrated Circuit	U12	Bellcore Issue 6	Level I	4.00	0.079239	1.00	.9545	0.079239	12620044.05
14S4021100	Integrated Circuit	U15,U22	Bellcore Issue 6	Level I	10.00	0.120485	2.00	2.9028	0.240970	8299772.79

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**Date** 11. 11, 1999  
**Environment** GF, GU - Ground Fixed, Uncontrolled  
**Temperature** 25.00

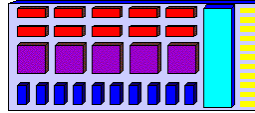


**Description** Top-level assembly  
**File Name** 456e.rpj  
**Time** 3:20 PM  
**Failure Rate** 8.301356  
**MTBF** 120,462

Part Number	Category	Location	Calculation Model	Quality	Tem. Rise	Failure Rate, Unit	Quantity	Failure Rate, %	Failure Rate	MTBF, Unit
14S4048500	Integrated Circuit	U34,U35	Bellcore Issue 6	Level I	8.00	0.070140	2.00	1.6899	0.140281	14257116.27
14S4148700	Integrated Circuit	U8	Bellcore Issue 6	Level I	12.00	0.077420	1.00	.9326	0.077420	12916624.12
14S4148910	Integrated Circuit	U7	Bellcore Issue 6	Level I	21.00	0.124506	1.00	1.4998	0.124506	8031761.35
14S4486500	Integrated Circuit	U1	Bellcore Issue 6	Level I	45.00	0.391279	1.00	4.7134	0.391279	2555722.02
14S4526100	Integrated Circuit	U26	Bellcore Issue 6	Level I	15.00	0.168759	1.00	2.0329	0.168759	5925622.25
14S4555001	Integrated Circuit	U3	Bellcore Issue 6	Level I	30.00	0.195076	1.00	2.3499	0.195076	5126205.46
14S4802910	Integrated Circuit	U6	Bellcore Issue 6	Level I	10.00	0.069400	1.00	.8360	0.069400	14409189.92
14S4804200	Integrated Circuit	U33	Bellcore Issue 6	Level I	8.00	0.062123	1.00	.7483	0.062123	16097220.79
14S4866100	Integrated Circuit	U4	Bellcore Issue 6	Level I	11.00	0.073313	1.00	.8831	0.073313	13640096.66
14S5000600	Integrated Circuit	U27	Bellcore Issue 6	Level I	13.00	0.115258	1.00	1.3884	0.115258	8676209.89
14S5503200	Integrated Circuit	U30	Bellcore Issue 6	Level I	7.00	0.088777	1.00	1.0694	0.088777	11264182.63
14S5701410	Integrated Circuit	U36	Bellcore Issue 6	Level I	8.00	0.059899	1.00	.7216	0.059899	16694882.52
14S6025610	Integrated Circuit	U16-17,U23-25	Bellcore Issue 6	Level I	17.00	0.487839	5.00	29.3831	2.439197	2049855.06
14S6125802	Integrated Circuit	U18,U20	Bellcore Issue 6	Level I	14.00	0.168134	2.00	4.0508	0.336268	5947634.20
14S6201010	Integrated Circuit	U10	Bellcore Issue 6	Level I	7.00	0.215962	1.00	2.6015	0.215962	4630447.71
14S6334600	Integrated Circuit	U28	Bellcore Issue 6	Level I	6.00	0.047050	1.00	.5668	0.047050	21254073.36
14S8203250	Integrated Circuit	U11	Bellcore Issue 6	Level I	10.00	0.069400	1.00	.8360	0.069400	14409189.92
14S8416800	Integrated Circuit	U9	Bellcore Issue 6	Level I	13.00	0.086930	1.00	1.0472	0.086930	11503478.64
14S9055500	Integrated Circuit	U31	Bellcore Issue 6	Level I	8.00	0.074589	1.00	.8985	0.074589	13406784.90
1540733008	Resistor	RN2-9	Bellcore Issue 6	Level I		0.006246	8.00	.6019	0.049968	160102772.00
1540747208	Resistor	RN1,RN10-11	Bellcore Issue 6	Level I		0.006246	3.00	.2257	0.018738	160102772.00
1651003222	Connection	U13	Bellcore Issue 6	Level I		0.018207	1.00	.2193	0.018207	54923766.92
1651203291	Connection	U10	Bellcore Issue 6	Level I		0.018207	1.00	.2193	0.018207	54923766.92
1651572000	Connection	SIMM1,SIMM2	Bellcore Issue 6	Level I		0.040966	2.00	.9870	0.081932	24410563.08
1653002100	Connection	J1,J8	Bellcore Issue 6	Level I		0.001138	2.00	.0274	0.002276	878780270.71
1653002200	Connection	(J2,J3)	Bellcore Issue 6	Level I		0.002276	1.00	.0274	0.002276	439390135.35
1653003100	Connection	JP1	Bellcore Issue 6	Level I		0.001707	1.00	.0206	0.001707	585853513.81
1653004100	Connection	JP5	Bellcore Issue 6	Level I		0.003414	1.00	.0411	0.003414	292926756.90
1653004100	Connection	J4,(JP4,J6)	Bellcore Issue 6	Level I		0.002276	2.00	.0548	0.004552	439390135.35
1653004300	Connection	(JP2,JP3)	Bellcore Issue 6	Level I		0.006828	1.00	.0822	0.006828	146463378.45
1653005100	Connection	J5,J7	Bellcore Issue 6	Level I		0.002845	2.00	.0685	0.005690	351512108.28

**AAEON Reliability Prediction Report**

**Part Number** 9697456011  
**Reference Des**  
**Date** 11. 11, 1999  
**Environment** GF, GU - Ground Fixed, Uncontrolled  
**Temperature** 25.00



**Description** Top-level assembly  
**File Name** 456e.rpj  
**Time** 3:20 PM  
**Failure Rate** 8.301356  
**MTBF** 120,462

Part Number	Category	Location	Calculation Model	Quality	Tem. Rise	Failure Rate, Unit	Quantity	Failure Rate, %	Failure Rate	MTBF, Unit
1653120225	Connection	CON2	Bellcore Issue 6	Level I		0.022759	1.00	.2742	0.022759	43939013.54
1653132220	Connection	CON1	Bellcore Issue 6	Level I		0.036414	1.00	.4387	0.036414	27461883.46
1653205200	Connection	CN7	Bellcore Issue 6	Level I		0.005690	1.00	.0685	0.005690	175756054.14
1653207200	Connection	CN6	Bellcore Issue 6	Level I		0.007966	1.00	.0960	0.007966	125540038.67
1653213201	Connection	CN4	Bellcore Issue 6	Level I		0.014793	1.00	.1782	0.014793	67598482.36
1653217202	Connection	CN3	Bellcore Issue 6	Level I		0.019345	1.00	.2330	0.019345	51692957.10
1653220203	Connection	CN1	Bellcore Issue 6	Level I		0.022759	1.00	.2742	0.022759	43939013.54
1653222200	Connection	CN2	Bellcore Issue 6	Level I		0.025035	1.00	.3016	0.025035	39944557.76
1654066400	Connection	CN5	Bellcore Issue 6	Level I		0.085346	1.00	1.0281	0.085346	11717070.28
1654409103	Connection	CN8	Bellcore Issue 6	Level I		0.005121	1.00	.0617	0.005121	195284504.60
1654515302	Connection	CN9	Bellcore Issue 6	Level I		0.008535	1.00	.1028	0.008535	117170702.76
1654606200	Connection	CN11	Bellcore Issue 6	Level I		0.003414	1.00	.0411	0.003414	292926756.90
1659254005	Connection	CN10	Bellcore Issue 6	Level I		0.002845	1.00	.0343	0.002845	351512108.28
1752000500	Miscellaneous	F1	Bellcore Issue 6	Level I		0.030000	1.00	.3614	0.030000	33333333.33
1759400002	Miscellaneous	BZ1	Bellcore Issue 6	Level I		0.150000	1.00	1.8069	0.150000	6666666.67