Reliability Prediction Report for the CF-020400-059 (CF-170300-264) Unit

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1.0 Objective

This report summarizes the reliability prediction performed on the CF-170300-264 Unit using documentation provided by Amphenol Aerospace. The prediction calculates estimated reliability of the assembly in units of failure rate expressed in failures per million hours (FPMH) and mean time between failure (MTBF). The prediction is based on the number, type and quality of components used, use-environment, applied stresses and other factors significant to overall reliability of the end product. Results of the reliability prediction can serve the following purposes:

- Help satisfy Customer product reliability requirements.
- Help assess the effect of product reliability on system maintenance activity and spares inventory.
- Provide input necessary for unit and system-level Life Cycle Cost analysis.
- Provide input necessary to set in-service performance standards.
- Establish test standards for products requiring a reliability test.
- Identify areas for improvement in the design and assess design trade-offs.
- Provide input necessary for system-level reliability models.

2.0 Executive Summary

Results of the failure rate calculations and predicted MTBF for the assembly are shown in the table below. The prediction is based on operation in an Airborne, Inhabited Cargo environment at an ambient operating temperature of 55°C and the assumptions shown in paragraph 3.1. The data below represents the steady state failure rate of the products.

DESCRIPTION	QTY	FAILURE RATES		
		EA Unit (FPMH)	TOTAL (FPMH)	MTBF (Hrs)
CF-170300-264 Unit	1	22.53	22.53	44,390

3.0 Reliability Prediction Method

Failure rates for individual components and assemblies are calculated using the stress prediction methodology of MIL-HDBK-217F Notice 2. Specific ground rules and assumptions used to achieve these results are presented in Section 3.1.

Manufacturer and manufacturer part numbers are taken from the expanded Bill of Materials (BOM) and used to obtain manufacturer datasheets. Manufacturer datasheets define the part quality level and provide information used to assign the part to a part classification and category defined in MIL-HDBK-217. Part classification and quality levels determined from the datasheet are factored together with use-environment and application stress factors using failure rate models from MIL-HDBK-217 to determine contribution of each part to overall product failure rate. Where the manufacturer datasheet does not sufficiently define these parameters, an estimation is used based on part description, comparison to similar components and/or default assumptions. Vendor provided failure rate data is also used when available.

3.1 Reliability Prediction Ground Rules and Assumptions

The following assumptions are used for this analysis:

- Operational environmental factor used: Airborne Inhabited Cargo (AIC) with 100% duty cycle. The Airborne Inhabited Cargo environment include typical conditions in cargo compartments which can be occupied by an aircrew. Environmental extremes of pressure, temperature, shock and vibration are minimal. Examples include long mission aircraft such as the C130, C5, B52, and C141.
- Temperature and Electrical Stress: The reliability prediction is calculated at an assumed worst case electrical stress of 50% and an ambient temperature of 55°C with a temperature rise of 5°C to case and connector insert and 10°C to semiconductor junction.
- Connector mate/de-mate cycle factors assume a maximum 0 to 0.05 mate/de-mates per 1000 hours.
- Quality factors for commercial components were adjusted using the ANSI/VITA 51.1-2008 Reliability Prediction MIL-HDBK-217 Subsidiary Specification to yield more consistent and realistic results. Based on the ANSI/VITA specification the following quality factor adjustments are used. Note these are designated by "piQ" in the Appendix tables.
    - Microcircuits: from 10 to 1
    - Semiconductors: from various factors based on type to 1
    - Resistors: from 10 to 0.1
    - Ceramic Capacitors: from 10 to 0.1
    - Tantalum Capacitors: 10 to 0.9

- Failure rate data for many of the microcircuits was provided by the OEM Vendors or was available on the Vendor's website and used in this analysis. This data is compiled by the Vendors as part of their qualification and periodic High Temperature Operating Life Test requirements and is considered the best source of reliability data for these parts. The data is scaled to account for operation of the microcircuits in an Airborne Inhabited Cargo environment using conversion factors published in the Reliability Information Analysis Center (RiAC) System Reliability Toolkit 2005 Edition. When Vendor data is used, the microcircuits calculation includes the tag "Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit" in the stress and prediction factors row of Appendix A.
- A number of parts did not have directly relatable failure models in MIL-HDBK-217. These parts were calculated using the nearest relatable model based on engineering judgment as shown in the table below.

Best Fit Failure Model Assignment

Part Number	Description	MIL-HDBK-217 Failure Model Used
1253-1567-1-ND	OSC XO 25.0000MHZ CMOS SMD (2mm x 1.6mm)	S5.1 Model, Linear Bipolar & MOS 1 to 100 xtrs
913-A4C25616D3B-12BIN	4Gb DDR3-1600 SDRAM, 256Mb x 16, FBGA96, Industrial	S5.2 Model, DRAM, 64M to 256M Bits (Largest Model Available)
HM7142NLT	10G Ethernet Transformer	S11.1 Model, Low Power Pulse (Peak Pwr <300W, Ave Pwr <5W)
LTM4650AEY#PBF	DC/DC 4.5-16Vin 0.6v to 5.5vout 25/25	S5.1 Model, Linear Bipolar & MOS 301 to 1,000 xtrs
MX30LF2G18AC-XKI	NAND FLASH SLC 258Mx8 63VFBGA I-TEMP	S5.2 Model, EEPROM, FLOTOX, 64M to 256M Bits (Largest Model Available)
Various	True 0 Ohm Jumper	S9.1 Model, RM Style (Chip)
Various	Ferrite Bead	S11.2 Model, Fixed Inductor or Chock
XC2752DKR-ND	OSC XO 25.0000MHZ CMOS SMD 1.6 to 3.6v (-40 to 85C)	S5.1 Model, Linear Bipolar & MOS 1 to 100 xtrs

4.0 Reliability Prediction Analysis

4.1 Prediction Results

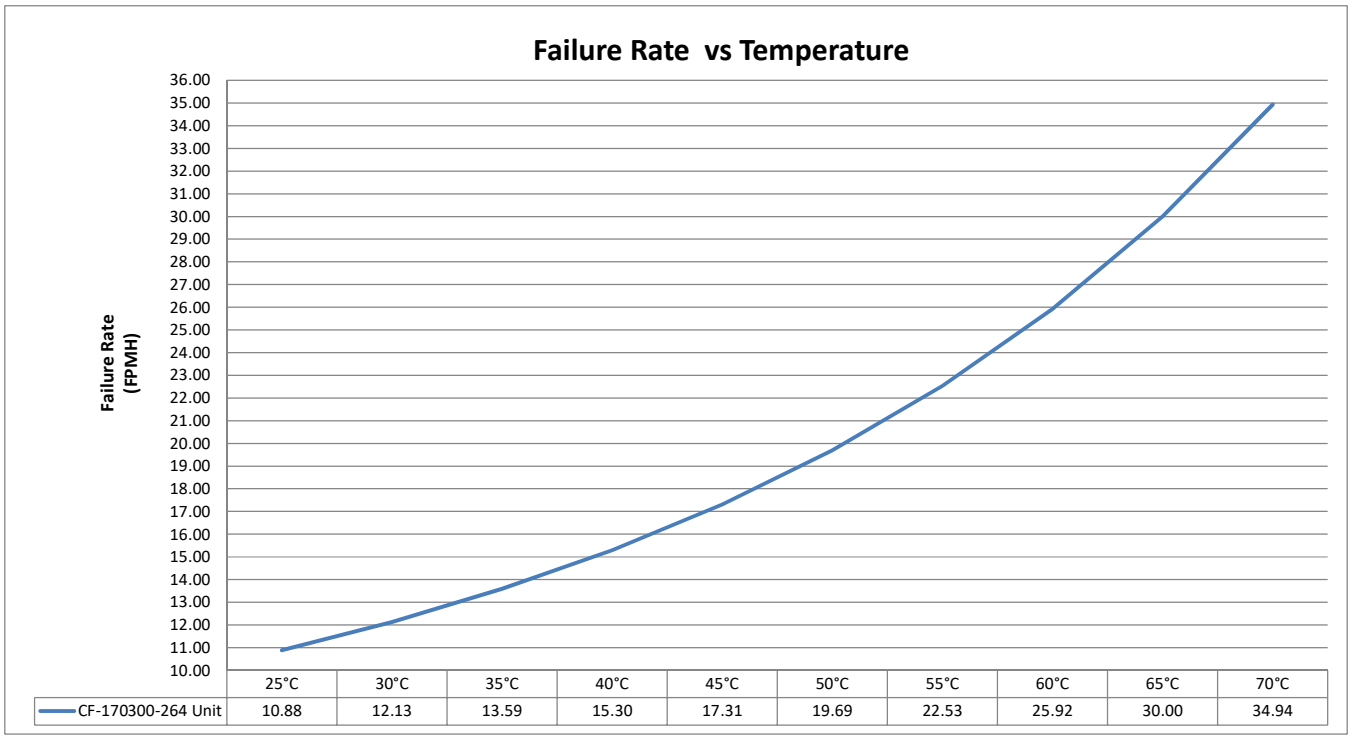
The predicted failure rate in FPMH and MTBF (hrs) for the CF-170300-264 Unit is detailed in the table below.

The prediction is based on an ambient operating temperature of 55°C and the assumptions detailed earlier in this report. Summary worksheets that include detailed prediction factors and other information used to determine failure rates for individual components used are included in Appendix A. At the end of each summary sheet in Appendix A is a pie graph that details failure contribution of each component type to that assemblies overall failure rate.

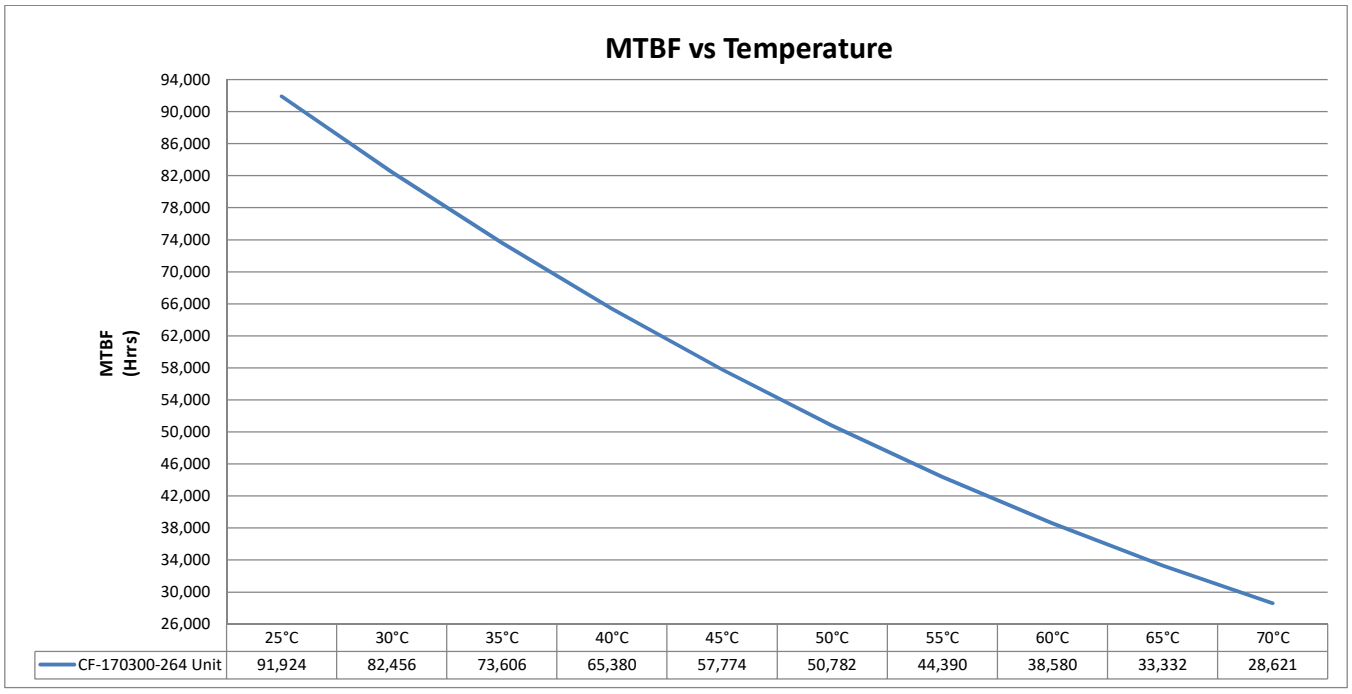
DESCRIPTION	QTY	FAILURE RATES		
		EA Unit (FPMH)	TOTAL (FPMH)	MTBF (Hrs)
CF-170300-264 Unit	1	22.53	22.53	44,390

4.1.1 Prediction Results vs Temperature

The predicted failure rate (FPMH) and MTBF (hrs) changes versus changes in ambient operation temperature is shown in the charts below.



	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C
CF-170300-264 Unit	10.88	12.13	13.59	15.30	17.31	19.69	22.53	25.92	30.00	34.94

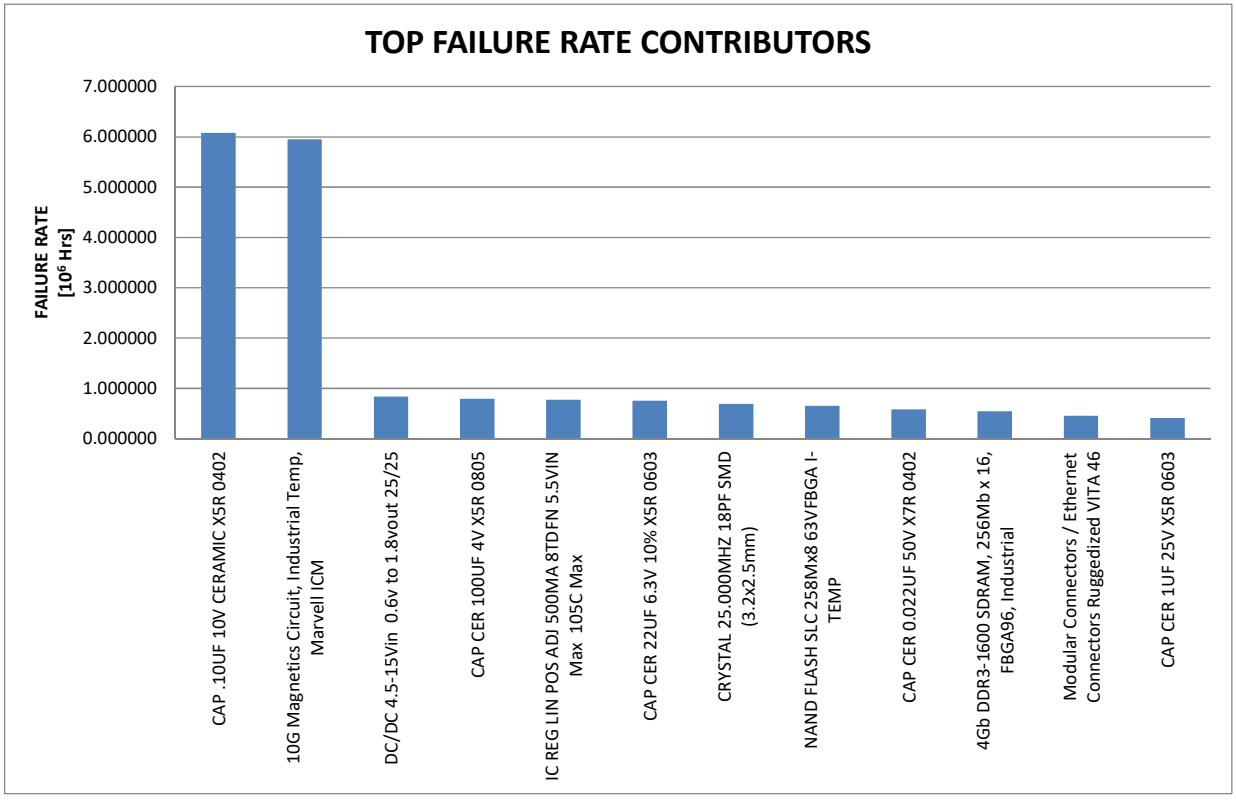


	25°C	30°C	35°C	40°C	45°C	50°C	55°C	60°C	65°C	70°C
CF-170300-264 Unit	91,924	82,456	73,606	65,380	57,774	50,782	44,390	38,580	33,332	28,621

4.2 Major Component Contributor List

The calculations indicate the components shown in the table and graph below were the major contributors to total failure rate at 55°C. Note that the table is weighted by quantity.

ASSEMBLY/REF DES	PART NO.	DESCRIPTION	QTY	EA PART (FPMH)	TOTAL (FPMH)	% of TOTAL FAILURE RATE
CF-170300-264	399-3027-1-ND	CAP .10UF 10V CERAMIC X5R 0402	471	0.012903	6.077084	26.98%
CF-170300-264	HM7142NL	10G Magnetics Circuit, Industrial Temp, Marvell ICM	9	0.661124	5.950114	26.41%
CF-170300-264	LTM4650AEY#PBF-ND	DC/DC 4.5-15Vin 0.6v to 1.8vout 25/25	2	0.419343	0.838685	3.72%
CF-170300-264	490-10510-1-ND	CAP CER 100UF 4V X5R 0805	33	0.024026	0.792845	3.52%
CF-170300-264	MAX38902AATA+T	IC REG LIN POS ADJ 500MA 8TDFN 5.5VIN Max 105C Max	1	0.777053	0.777053	3.45%
CF-170300-264	311-1815-1-ND	CAP CER 22UF 6.3V 10% X5R 0603	36	0.020965	0.754736	3.35%
CF-170300-264	300-3002-1-ND	CRYSTAL 25.000MHZ 18PF SMD (3.2x2.5mm)	1	0.686863	0.686863	3.05%
CF-170300-264	1092-1165-ND	NAND FLASH SLC 258Mx8 63VFBGA I-TEMP	1	0.652496	0.652496	2.90%
CF-170300-264	490-4763-1-ND	CAP CER 0.022UF 50V X7R 0402	52	0.011259	0.585458	2.60%
CF-170300-264	913-A4C25616D3B12BIN	4Gb DDR3-1600 SDRAM, 256Mb x 16, FBGA96, Industrial	1	0.542279	0.542279	2.41%
CF-170300-264	RVPX-P16DM2	Modular Connectors / Ethernet Connectors Ruggedized VITA 46	2	0.228766	0.457532	2.03%
CF-170300-264	490-16608-2-ND	CAP CER 1UF 25V X5R 0603	26	0.015874	0.412713	1.83%
	OTHERS	REMAINDER OF PARTS	N/A	N/A	3.999807	17.76%



APPENDIX A

DETAILED RELIABILITY PREDICTION SUMMARY SHEETS

55°C OPERATING TEMPERATURE

CF-170300-264 Unit

CF-170300-264 Unit

REF DES	PART NO.	DESCRIPTION	QTY	FAILURE RATES (FPMH) EA PART	FAILURE RATES (FPMH) TOTAL	MIL-HDBK-217F NOTICE 2 RELIABILITY PREDICTION: 55°C, Aic ENVIRONMENT
Microcircuits (S5.1 - S5.7)				**Prediction Factors >>**		**TJ (C)** / **TJ (C) Rise** / **No Pins** / **C1** / **piT** / **C2** / **piCYC/ piA** / **piL** / **piQ** / **piE**
U13	XC2752DKR-ND	OSC XO 25.0000MHZ CMOS SMD (2.5mm x 2mm) 1.6 to 3.6v (-4(	1	0.061808	0.061808	70.0 / 15.0 / 4 / 0.020 / 2.77 / 0.002 / N/A / 1 / 1 / 4
U16	1253-1567-1-ND	OSC XO 25.0000MHZ CMOS SMD (2mm x 1.6mm)	1	0.034122	0.034122	70.0 / 15.0 / 4 / 0.010 / 2.77 / 0.002 / N/A / 1 / 1 / 4
U17	W25Q80DVSNIGCT-ND	IC FLASH 8MBIT 104MHZ 8SOIC	1	0.090164	0.090164	70.0 / 15.0 / 8 / 0.0272 / 2.14 / 0.003 / 0.0182 / 1 / 1 / 4
U4, U6	LTM4650AEY#PBF-ND	DC/DC 4.5-15Vin 0.6v to 1.8vout 25/25	2	0.419343	0.838685	70.0 / 15.0 / 144 / 0.040 / 2.77 / 0.077 / N/A / 1 / 1 / 4
U11	913-A4C25616D3B12BIN	4Gb DDR3-1600 SDRAM, 256Mb x 16, FBGA96, Industrial	1	0.542279	0.542279	70.0 / 15.0 / 96 / 0.1600 / 2.14 / 0.050 / 0.0000 / 1 / 1 / 4
U12	1092-1165-ND	NAND FLASH SLC 258Mx8 63VFBGA I-TEMP	1	0.652496	0.652496	70.0 / 15.0 / 63 / 0.1088 / 2.14 / 0.032 / 0.2928 / 1 / 1 / 4
U20	8T49N008A-000NLGI	FemtoClock 8-output programmable clock generator	1	0.125202	0.125202	70.0 / 15.0 / 40 / 0.080 / 0.60 / 0.019 / N/A / 1 / 1 / 4
U24	88E1512-A0-NNP2I000	10/100/1G Ethernet PHY Industrial Temp QFN56	1	0.003333	0.003333	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U8	88F6820-B0-BRT4I160	MARVELL/88F6820-A0-BRT4C160 I-TEMP	1	0.013333	0.013333	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U12A	88X3340-A1-BUT4I000	10/100/1G/10G Industrial Temp AlaskaX PHY	0	0.003333	0.000000	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U12B, U12C	88X3340-A1-BUT4I000	10/100/1G/10G Industrial Temp AlaskaX PHY	2	0.003333	0.006667	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U1	98DX8548A0-BWY4I000	Aldrin2 25+49 Port 10G Switch Industrial Temp	1	0.000344	0.000344	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U9, U25	296-27844-1-ND	IC I/O EXPANDER I2C 24B 32UQFN	2	0.000228	0.000457	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U14	296-28767-1-ND	IC REG SINK/SOURCE DDR 10SON (EXT ATEMP)	1	0.000228	0.000228	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U18, U27	296-46362-1-ND	Temperature Sensor Digital, Local -40°C ~ 125°C 9 b 8-VSSOP	2	0.003344	0.006688	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U28	LM3880MF-1AB/NOPB	IC PWR SUPPLY SEQUENCER SOT23-6, 30ms, ExtTemp	1	0.009327	0.009327	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U5	MAX38902AATA+T	IC REG LIN POS ADJ 500MA 8TDFN 5.5VIN Max 105C Max	1	0.777053	0.777053	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U2, U3, U10	MAXM17515ALI+-ND	DC/DC 0.75v to 3.6v 5Amp, 2.4-5.5vin, Industrial Temp	3	0.030683	0.092048	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U7, U23	DS2502P-E48+-ND	48-BIT NODE/MAC ID CHIP, 6TSOC	2	0.040884	0.081767	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U22	NLV27WZ16DFT2GOSCT-	IC CLK BUFFER 1:1 SC88 2 CHANNEL, 1.6-5v -55 to 125C	1	0.007190	0.007190	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U15, U21, U26	ISL8201MIRZ-TCT-ND	10A +4.5v to 14v Winde Range Regulator	3	0.006138	0.018415	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U19	122-1821-ND	IC CPLD 64MC 6.7NS 48QFN ITEMP	1	0.036503	0.036503	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
U29	ICL3221EIVZ-TCT-ND	IC TXRX SGL RS232 3-5.5V 16TSSOP ITEMP	1	0.029192	0.029192	Vendor Published Data, Scaled for Airborne Inhabited Cargo Environment per RAC Reliability Toolkit
Diodes - Opto-Isolators, Isolators, LEDs (S6.11)				**Prediction Factors >>**		**TJ (C)** / **TJ (C) Rise** / **lamB** / **piT** / **piQ** / **piE**
D1, D2, D3, D4, D5,	160-1443-1-ND	Green SMT LED	6	0.003142	0.018853	70.0 / 15.0 / 0.00023 / 3.42 / 1 / 4
D7, D8, D9, D10, D1	754-1101-1-ND	Green 570nm LED Indication - Discrete 2.1V 0402 (1005 Metric)	48	0.003142	0.150826	70.0 / 15.0 / 0.00023 / 3.42 / 1 / 4
Resistors (S9.1)				**Prediction Factors >>**		**Case (C)** / **Rated Pwr (W)** / **Pwr Stress** / **lamB** / **piT** / **piP** / **piS** / **piQ** / **piE**
R180E, R180F, R18(	311-0.0NCT-ND	RES SMD 0 OHM JUMPER 1/20W 0201	0	0.002698	0.000000	60.0 / 0.050 / 0.50 / 0.0037 / 1.4 / 0.24 / 1.23 / 0.1 / 18
R180A, R180B, R18(	311-0.0NCT-ND	RES SMD 0 OHM JUMPER 1/20W 0201	32	0.002698	0.086328	60.0 / 0.050 / 0.50 / 0.0037 / 1.4 / 0.24 / 1.23 / 0.1 / 18
R91, R150, R209	311-100KJRCT-ND	RES SMD 100K OHM 5% 1/16W 0402	3	0.002943	0.008829	60.0 / 0.063 / 0.50 / 0.0037 / 1.4 / 0.26 / 1.23 / 0.1 / 18
R4, R5, R7	311-10KGCT-ND	RES 10K OHM 1/10W 5% 0603 SMD	0	0.003535	0.000000	60.0 / 0.100 / 0.50 / 0.0037 / 1.4 / 0.31 / 1.23 / 0.1 / 18
R357, R366	311-121KHRCT-ND	RES SMD 121K OHM 1% 1/10W 0603	2	0.003535	0.007070	60.0 / 0.100 / 0.50 / 0.0037 / 1.4 / 0.31 / 1.23 / 0.1 / 18
R347	311-127KHRCT-ND	RES SMD 127K OHM 1% 1/10W 0603	1	0.003535	0.003535	60.0 / 0.100 / 0.50 / 0.0037 / 1.4 / 0.31 / 1.23 / 0.1 / 18
R21, R22, R269	311-240LRCT-ND	RES SMD 240 OHM 1% 1/16W 0402	3	0.002943	0.008829	60.0 / 0.063 / 0.50 / 0.0037 / 1.4 / 0.26 / 1.23 / 0.1 / 18
R336, R352	311-300HRCT-ND	RES 300 OHM 1/10W 1% 0603 SMD	2	0.003535	0.007070	60.0 / 0.100 / 0.50 / 0.0037 / 1.4 / 0.31 / 1.23 / 0.1 / 18
R242, R243, R244, F	311-39.0LRCT-ND	RES SMD 39 OHM 1% 1/16W 0402	26	0.002943	0.076519	60.0 / 0.063 / 0.50 / 0.0037 / 1.4 / 0.26 / 1.23 / 0.1 / 18
R215, R216	311-470GCT-ND	RES 470 OHM 1/10W 5% 0603 SMD	2	0.003535	0.007070	60.0 / 0.100 / 0.50 / 0.0037 / 1.4 / 0.31 / 1.23 / 0.1 / 18
R301, R311	311-49.9LRTR-ND	RES SMD 49.9 OHM 1% 1/16W 0402	2	0.002943	0.005886	60.0 / 0.063 / 0.50 / 0.0037 / 1.4 / 0.26 / 1.23 / 0.1 / 18

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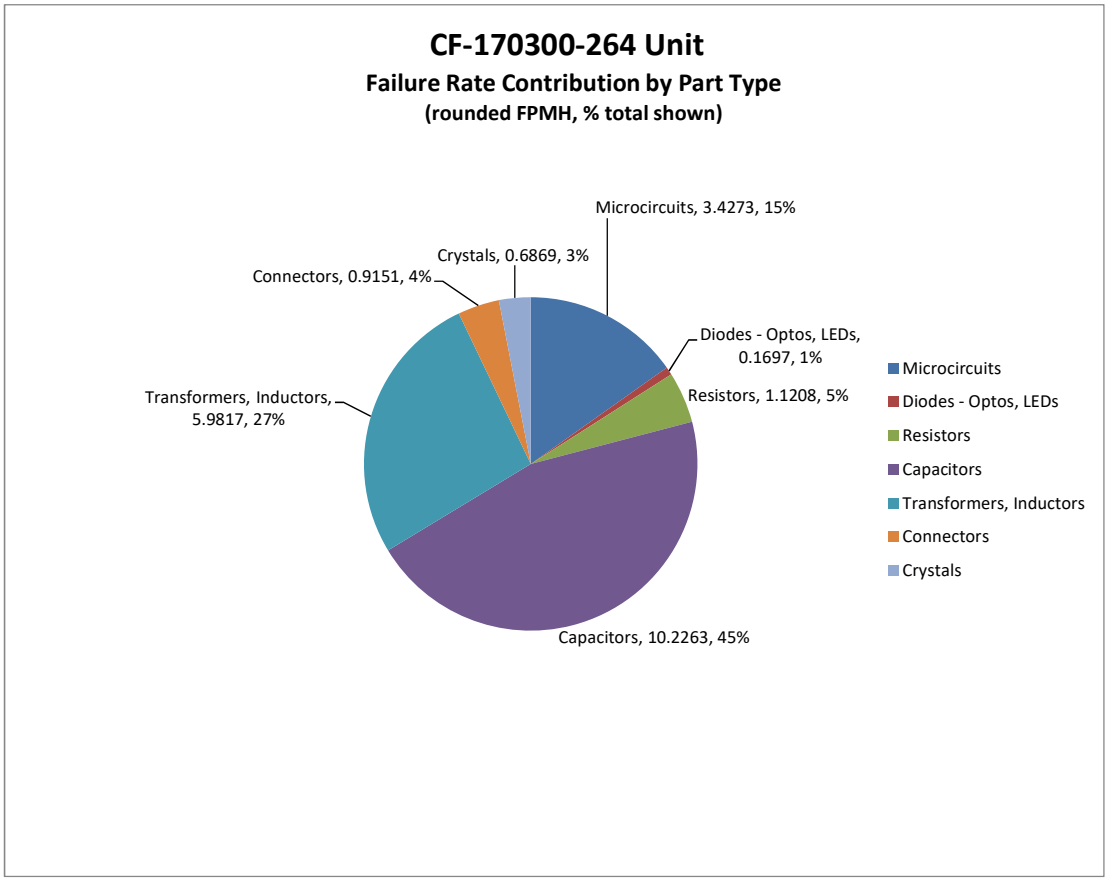
Resistors (S9.1) Cont.				Prediction Factors >>		Case (C)	Rated Pwr (W)	Pwr Stress	lamB	piT	piP	piS	piQ	piE	
R179, R184, R192, F	311-75.0HRCT-ND	RES 75.0 OHM 1/10W 1% 0603 SMD	4	0.003535	0.014140	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R169A, R169B, R16	311-75.0LRCT-ND	RES 75.0 OHM 1/10W 1% 0402 SMD	48	0.003535	0.169685	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R181	541-4.87KHCT-ND	RES 4.87K OHM 1/10W 1% 0603 SMD	1	0.003535	0.003535	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R13, R14, R15, R16,	A129617CT-ND	RES SMD 150 OHM 1% 1/10W 0402	8	0.003535	0.028281	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R6, R102	P0.0JCT-ND	RES 0.0 OHM 1/10W 0402 SMD	0	0.003535	0.000000	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R8, R94, R99, R350,	P0.0JCT-ND	RES 0.0 OHM 1/10W 0402 SMD	5	0.003535	0.017675	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R9, R149, R151	P1.0KGCT-ND	RES 1.0K OHM 1/10W 5% 0603 SMD	3	0.003535	0.010605	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R329, R333, R392, F	P10.2KLCT-ND	RES 10.2K OHM 1/10W 1% 0402 SMD	4	0.003535	0.014140	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R316, R317	P100LCT-ND	RES SMD 100 OHM 1% 1/10W 0402	2	0.003535	0.007070	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R41, R284, R303, R	P4.7KJCT-ND	RES 4.7K OHM 1/10W 5% 0402 SMD	0	0.003535	0.000000	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R1, R2, R3, R25, R2	P4.7KJCT-ND	RES 4.7K OHM 1/10W 5% 0402 SMD	108	0.003535	0.381791	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R42, R47, R49, R52,	P430JCT-ND	RES SMD 430 OHM 5% 1/10W 0402	52	0.003535	0.183825	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R148	P6.49KHCT-ND	RES 6.49K OHM 1/10W 1% 0603 SMD	1	0.003535	0.003535	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R166A, R166B, R16	RC0402FR-074K99L	RES SMD 4.99K OHM 1% 1/16W 0402	7	0.002943	0.020601	60.0	0.063	0.50	0.0037	1.4	0.26	1.23	0.1	18	
R339	RMCF0402FT4K22CT-ND	RES 4.22K OHM 1% 1/16W 0402	1	0.002943	0.002943	60.0	0.063	0.50	0.0037	1.4	0.26	1.23	0.1	18	
R290, R299, R300, F	RMCF0402FT6K04CT-ND	RES 6.04K OHM 1% 1/16W 0402	6	0.002943	0.017658	60.0	0.063	0.50	0.0037	1.4	0.26	1.23	0.1	18	
R237	RMCF0603FT3K40CT-ND	RES 3.4K OHM 1/10W 1% 0603 SMD	1	0.003535	0.003535	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R361, R364	RMCF0603FT90K9CT-ND	RES 90.9K OHM 1% 1/10W 0603	2	0.003535	0.007070	60.0	0.100	0.50	0.0037	1.4	0.31	1.23	0.1	18	
R390	YAG3126CT-ND	RES SMD 34K OHM 1% 1/16W 0402	1	0.002943	0.002943	60.0	0.063	0.50	0.0037	1.4	0.26	1.23	0.1	18	
R310, R323, R328, F	YAG3259CT-ND	RES SMD 931 OHM 1% 1/16W 0402	6	0.002943	0.017658	60.0	0.063	0.50	0.0037	1.4	0.26	1.23	0.1	18	
R391	YAG3270CT-ND	RES SMD 9.76K OHM 1% 1/16W 0402	1	0.002943	0.002943	60.0	0.063	0.50	0.0037	1.4	0.26	1.23	0.1	18	

Capacitors (S10.1)				Prediction Factors >>		Case Temp (C)	VApplied	VStress	lamB	piT	piC	piV	piSR	piQ	piE
C34, C36	1276-1140-1-ND	CAP CER 18PF 50V C0G/NP0 0402	0	0.005938	0.000000	60	25	0.50	0.00200	4.19	0.37	1.6	1	0.1	12
C24, C25, C30	1276-1140-1-ND	CAP CER 18PF 50V C0G/NP0 0402	3	0.005938	0.017814	60	25	0.50	0.00200	4.19	0.37	1.6	1	0.1	12
C119, C261, C408	1276-1869-1-ND	CAP CER 10UF 25V X5R 0603	3	0.019529	0.058586	60	12.5	0.50	0.00200	4.19	1.23	1.6	1	0.1	12
C28, C29, C35	311-1069-1-ND	CAP 100PF 50V CERAMIC NPO 0603	0	0.008525	0.000000	60	25	0.50	0.00200	4.19	0.54	1.6	1	0.1	12
C180, C211, C249, (	311-1080-1-ND	CAP 1000PF 50V CERAMIC NPO 0603	4	0.008525	0.034098	60	25	0.50	0.00200	4.19	0.54	1.6	1	0.1	12
C81, C230, C281A, (	311-1815-1-ND	CAP CER 22UF 6.3V 10% X5R 0603	36	0.020965	0.754736	60	3.15	0.50	0.00200	4.19	1.32	1.6	1	0.1	12
C1, C2, C12, C13, C	399-3027-1-ND	CAP .10UF 10V CERAMIC X5R 0402	471	0.012903	6.077084	60	5	0.50	0.00200	4.19	0.81	1.6	1	0.1	12
C111A, C111B, C11	399-4886-1-ND	CAP CER 0.22UF 6.3V X5R 0402	18	0.013851	0.249324	60	3.15	0.50	0.00200	4.19	0.87	1.6	1	0.1	12
C656	445-2494-1-ND	CAP CER 0.01UF 25V X8R 10% 0402	0	0.010488	0.000000	60	12.5	0.50	0.00200	4.19	0.66	1.6	1	0.1	12
C83	445-2494-1-ND	CAP CER 0.01UF 25V X8R 10% 0402	1	0.010488	0.010488	60	12.5	0.50	0.00200	4.19	0.66	1.6	1	0.1	12
C157, C187, C188, (	445-5178-1-ND	CAP CER 4.7UF 6.3V 10% X5R 0603	15	0.018246	0.273687	60	3.15	0.50	0.00200	4.19	1.15	1.6	1	0.1	12
C72, C73, C86, C87	445-5942-1-ND	CAP CER 0.1UF 50V 10% X5R 0402	4	0.012903	0.051610	60	25	0.50	0.00200	4.19	0.81	1.6	1	0.1	12
C403	445-5950-1-ND	CAP CER 0.33UF 50V 10% X7R 0603	1	0.014366	0.014366	60	25	0.50	0.00200	4.19	0.91	1.6	1	0.1	12
C3, C5, C6, C202A,	490-10510-1-ND	CAP CER 100UF 4V X5R 0805	33	0.024026	0.792845	60	2	0.50	0.00200	4.19	1.51	1.6	1	0.1	12
C675, C716, C717, (	490-10749-1-ND	CAP CER 22UF 25V X5R 0805	6	0.020965	0.125789	60	12.5	0.50	0.00200	4.19	1.32	1.6	1	0.1	12
C506, C509, C583, (	490-13244-1-ND	CAP CER 47UF 2.5V X6S 0603	6	0.022447	0.134684	60	12.5	0.50	0.00200	4.19	1.41	1.6	1	0.1	12
C534, C673, C676	490-13970-1-ND	CAP CER 220UF 6.3V X5R 1206	3	0.025792	0.077377	60	3.15	0.50	0.00200	4.19	1.62	1.6	1	0.1	12
C8, C10, C20, C185,	490-16608-2-ND	CAP CER 1UF 25V X5R 0603	26	0.015874	0.412713	60	12.5	0.50	0.00200	4.19	1.00	1.6	1	0.1	12
C287A, C287B, C28	490-4763-1-ND	CAP CER 0.022UF 50V X7R 0402	52	0.011259	0.585458	60	25	0.50	0.00200	4.19	0.71	1.6	1	0.1	12
C288, C291A, C291	581-1206GC102K	CAP 2000V 1000PF 10% X7R 1206	13	0.008525	0.110820	60	1000	0.50	0.00200	4.19	0.54	1.6	1	0.1	12
C4, C7, C9, C11, C3	587-1256-1-ND	CAP CER 10UF 6.3V X5R 0603	13	0.019529	0.253874	60	3.15	0.50	0.00200	4.19	1.23	1.6	1	0.1	12

Capacitors (S10.1) Cont.				Prediction Factors >>		Case Temp (C)	VApplied	VStress	lamB	piT	piC	piV	piSR	piQ	piE
C141, C279, C341	587-3152-1-ND	CAP CER 100UF 16V X5R 1210	3	0.024026	0.072077	60	8	0.50	0.00200	4.19	1.51	1.6	1	0.1	12
C48, C194, C306	587-5449-1-ND	CAP CER 330UF 6.3V X5R 1210	3	0.026751	0.080253	60	3.15	0.50	0.00200	4.19	1.69	1.6	1	0.1	12
C31, C32, C33, C48(	P16259CT-ND	CAP TANT POLY 470UF 2.5V 2917	9	0.004293	0.038637	60	1.25	0.50	0.00005	1.85	4.12	1.0	1	0.9	12
Transformers, Inductors (S11.1, 11.2)				**Prediction Factors >>**		**Case Temp (C)**	**Temp Rise (C)**	**Hot Spot (C)**	**lamB**	**piT**	**piQ**	**piE**			
T1A, T1B, T1C, T1D	HM7142NL	10G Magnetics Circuit, Industrial Temp, Marvell ICM	0	0.661124	0.000000	60.0	5.0	65.50	0.0220	1.67	3	6			
T1E, T1F, T1G, T1H	HM7142NL	10G Magnetics Circuit, Industrial Temp, Marvell ICM	9	0.661124	5.950114	60.0	5.0	65.50	0.0220	1.67	3	6			
L3, L4, L5, L6, L12, L	445-1549-1-ND	FERRITE 600 OHM 100MHz EMI Filter 0603 SMD	11	0.000902	0.009917	60.0	5.0	65.50	0.00003	1.67	3	6			
L1, L2	445-1566-1-ND	FERRITE BEAD 30 OHM 0805 1LN 6A	2	0.000902	0.001803	60.0	5.0	65.50	0.00003	1.67	3	6			
L27, L31, L34, L35	490-13269-1-ND	FERRITE BEAD 50 OHM 1206 12A	4	0.000902	0.003606	60.0	5.0	65.50	0.00003	1.67	3	6			
L8A, L8B, L8C, L8D,	490-5255-1-ND	FERRITE BEAD 220 OHM 0603 1LN	12	0.000902	0.010818	60.0	5.0	65.50	0.00003	1.67	3	6			
L6A, L6B, L6C, L7A,	BLM18KG121TN1D	FERRITE BEAD 120 OHM 0603 3AMP	6	0.000902	0.005409	60.0	5.0	65.50	0.00003	1.67	3	6			
Connectors (S15.1)				**Prediction Factors >>**		**Case Temp (C)**	**Insert Rise (C)**	**T Stress (C)**	**lamB**	**piT**	**piK**	**piQ**	**piE**		
U1010	QSH-040-01-L-D-DP-A	HIGH SPEED SOCKET, 0.5mm PITCH, DIFFERENTIAL PAIRS, 8(	1	0.228766	0.228766	60	5	65	0.04000	1.91	1	2	3		
U1000	RVPX-P08VM2	Modular Connectors / Ethernet Connectors Ruggedized VITA 46	1	0.228766	0.228766	60	5	65	0.04000	1.91	1	2	3		
U1001, U1002	RVPX-P16DM2	Modular Connectors / Ethernet Connectors Ruggedized VITA 46	2	0.228766	0.457532	60	5	65	0.04000	1.91	1	2	3		
Crystals (S19.1)				**Prediction Factors >>**		**Case Temp (C)**	**Op Freq (MHz)**		**lamB**	**piQ**	**piE**				
X1	300-3002-1-ND	CRYSTAL 25.000MHZ 18PF SMD (3.2x2.5mm)	1	0.686863	0.686863	60	25.0		0.027	2.1	12				
		CF-170300-264 Unit Total Failure Rate =			**22.527664**		= Biege colored cell indicates highest value for group.								
		FITS =			**22528**										
		MTBF =			**44,390**										


CF-170300-264 Unit
Failure Rate Contribution by Part Type
(rounded FPMH, % total shown)
Microcircuits, 3.4273, 15%
Crystals, 0.6869, 3%
Connectors, 0.9151, 4%
Diodes - Optos, LEDs, 0.1697, 1%
Resistors, 1.1208, 5%
Transformers, Inductors, 5.9817, 27%
Capacitors, 10.2263, 45%
Microcircuits
Diodes - Optos, LEDs
Resistors
Capacitors
Transformers, Inductors
Connectors
Crystals