

MTBF Model

The calculation is based on MIL-HDBK-217F, Notice 1, Appendix A: Parts Count Reliability. The prediction were performed with the power supply operating in a Ground Benign (Gb) controlled environment.

MIL-HDBK-217F

$$MTBF = \frac{1}{\lambda_{equip}} = \frac{1}{\sum_{i=1}^n N_i (\lambda_G)_i (\pi_Q)_i} \times 10^6$$

Where :

λ_G : Generic Failure Rate for the 'ith (Failures / 10^6 Hours)

π_Q : Quality Factor

π_L : Learning Factor

N_i : Quantity of the 'ith Generic Part

λ_{equip} : Total Equipment Failure Rate (Failures / 10^6 Hours)

n : Number of different Generic Part categories

| No. | Part Type | λ_G | π_Q | π_L | Ni | | | | | λ_{equip} |
|---|---|-------------|---------|---------|-----|--|--|--|--|-------------------|
| 1. | Resistor (Film), RN | 0.0014 | 10 | -- | 31 | | | | | 0.434 |
| 2 | Capacitor (Aluminum Dry),CE | 0.029 | 10 | -- | 6 | | | | | 1.74 |
| 3 | Capacitor (Ceramic,Gen. Purpose),CK | 0.0036 | 10 | -- | 18 | | | | | 0.648 |
| 4 | Capacitor (Metalized plastic/plastic) | 0.0029 | 10 | -- | 1 | | | | | 0.029 |
| 5 | Trandient Suppresor/Varistor | 0.0029 | 10 | -- | 1 | | | | | 0.029 |
| 6 | Thermistor | 0.065 | 10 | -- | 2 | | | | | 1.3 |
| 7 | Diode (Fast Recovery Pwr. Rectifier) | 0.065 | 5.5 | -- | 2 | | | | | 0.715 |
| 8 | Diode (General Purpose analog) | 0.0036 | 5.5 | -- | 10 | | | | | 0.198 |
| 9 | Diode (Power Rectifier/Schottky Pwr.) | 0.0028 | 5.5 | -- | 2 | | | | | 0.0308 |
| 10 | Diode (Voltage Ref./Reg ; Avalanche and Zener) | 0.0033 | 5.5 | -- | 1 | | | | | 0.01815 |
| 11 | Transistor (NPN/PNP, f<200MHz) | 0.00015 | 5.5 | -- | 0 | | | | | 0 |
| 12 | Transistor (Power ,MOSFET, f<200MHz) | 0.0057 | 5.5 | -- | 1 | | | | | 0.03135 |
| 13 | Diode (Thyristor/SCR) | 0.0025 | 5.5 | -- | 0 | | | | | 0 |
| 14 | Microcircuit (Bipolar technology, Gate /logic Arrays, Linear, 1-100 Transistors | 0.0095 | 10 | -- | 2 | | | | | 0.19 |
| 15 | Inductive Device (Low power Pulse XFMR) | 0.0035 | 10 | -- | 5 | | | | | 0.175 |
| 16 | Electronic Filter (Ceramic-Ferrite) | 0.022 | 2.9 | -- | 0 | | | | | 0 |
| 17 | FUSE | 0.01 | 1 | -- | 2 | | | | | 0.02 |
| 18 | Rotating Device(Motor) | 1.6 | 1 | -- | 0 | | | | | 0 |
| 19 | Switch (Toggle or Push-button) | 0.001 | 20 | -- | 0 | | | | | 0 |
| 20 | Connector(General) | 0.011 | 2 | -- | 5 | | | | | 0.11 |
| 21 | Hand Solder(Wrapping) | 0.00014 | 1 | -- | 8 | | | | | 0.00112 |
| 22 | Single Connections (Clip Termination) | 0.00012 | 1 | -- | 0 | | | | | 0 |
| 23 | Single Connections (Reflow Solder) | 0.000069 | 1 | -- | 205 | | | | | 0.014145 |
| Total Equipment Failure rate (Failures/ 10^6 hours) | | | | | | | | | | 5.683565 |

MTBF = 175,946 HOURS

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