

MTBF

Report of Apacer products, Flash Card & USB SSD Series

Dec, 2009

Version 1.2



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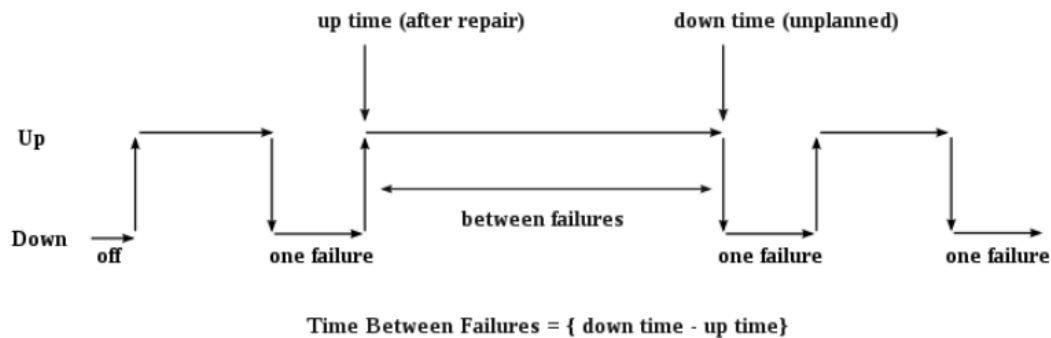
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MTBF

OVERVIEW

MTBF, stands for mean time between failures, is the average time between failures of hardware modules. It is the average time a manufacturer estimates before a failure occurs in a hardware module.



*This figure depicts the background of MTBF calculation and is granted by its author to anyone using this work for any purpose. For further detail, refer to http://en.wikipedia.org/wiki/File:Time_between_failures.svg

In above figure, downtime is the momentary period it went down uptime. The difference of downtime subtracts by uptime is the amount of time between the two events, which is the time between failures.

MTBF plays an important role in the development of products. Engineers of reliability and design engineers often utilize reliability applications to figure out a product's MTBF according to various methods/standards and to put efforts on the yield rate in the production.

MTBF PREDICTION

Apacer's MTBF prediction adopts and complies with Bellcore analysis method 1. Assuming device failure rate can be generated by the sum of failure rates in each component, then, a steady state failure rate can be expressed as below equation.

$$\lambda_{ss} = \pi_E \sum_{i=1}^m (Ni\lambda_{SSi})$$

- m : number of component types
- λ_{SS} : device failure rate at steady state
- Ni : quantity of i type component
- λ_{SSi} : failure rate for i type component at steady state
- π_E : device environment factor

PROCEDURE OF MTBF CALCULATION

1. Collect characteristic information of the product.
2. Prepare bill of material (BOM) and component specifications.
3. Analyze BOM and produce component parameters.
4. Determine calculation equation for every component.
5. Calculate failure rates of each component.
6. Generate product failure rate and MTBF.

CALCULATED MTBF (HOURS) BY PRODUCTS

Project	MTBF	NAND
<i>Industrial CFIII</i>	$\geq 2,008,211$	SLC
<i>Commercial CF</i>	$\geq 1,056,016$	MLC
<i>Industrial CF4</i>	$\geq 2,003,929$	SLC
<i>CompactFlash4</i>	$\geq 1,330,532$	MLC
<i>ATA CF</i>	$\geq 2,015,731$	SLC
<i>UDMII</i>	$\geq 2,503,911$	SLC

REVISION HISTORY

Revision	Date	Description	Remark
0.1	Aug 19, 2009	Preliminary release	
1.0	Aug 19, 2009	Formal version release	
1.1	Nov 23, 2009	Update Industrial CF4/CompactFlash4 MTBF	
1.2	Dec 09, 2009	Update references source	

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