



# MTBF Prediction Report

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<b>Model Name:</b>	<b>BTCV5W</b>
<b>Release Date:</b>	<b>2016-08-10</b>

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TABLE OF CONTENTS

- 1 PREDICTION DURATION ..... 3
- 2 PREDICTION SOFTWARE ..... 3
- 3 CONDITIONS AND ASSUMPTION..... 4
  - 1. AMBIENT TEMPERATURE: 35°C..... 4
  - 2. ENVIRONMENT: GB, GC - GROUND BENIGN, CONTROLLED..... 4
  - 3. MODEL: BTCV5W ..... 4
  - 4. COMPONENT QUALITY LEVEL: LEVEL II ..... 4
  - 5. CALCULATION MODEL: TELCORDIA ISSUE III ..... 4
  - 6. CALCULATION METHOD: CASE 3 ..... 4
- 4. SYSTEM CONFIGURATION ..... 4
- 5. SUMMARY OF RESULT ..... 5
  - 1. SYSTEM MTBF PREDICTION..... 5
  - 2. SYSTEM PREDICTION OF SURVIVAL OVER TIME..... 7
  - 3. Distribution of % of System Failure Rate..... 8
  - 4. Conclusion..... 8

# 1 Prediction Duration

2016/08/10

# 2 Prediction Software

Many hard/software systems are complex in their configuration. With RBD (Reliability Block Diagram) is a drawing and calculation tool used to model complex systems. The goal of an RBD is to produce a series of figures representing portions of a system that is to be analyzed. These calculations are based on established reliability prediction models, and then manufacturer's failure rate data was available. This MTBF report is calculated with Relex software.

## RBD Reliability Calculation

The reliability of a single unit, having an exponential failure distribution, with constant hazard rate is calculated at each time point with the equation:

$$R(t) = e^{-(\lambda t)}$$

Where R (t) is the reliability at time t and  $\lambda$  is the constant failure rate. For multiple series units the failure rate is given by:

$$\lambda_{System} = \sum_{i=1}^n \lambda_i$$

Where,  $\lambda_i$  is the failure rate of the  $i^{th}$  unit in series and  $\lambda_{System}$  is the effective failure rate of the n units in series. For Parallel (identical) units with switch probability of success = 1, the failure rate is given by:

$$\frac{1}{\lambda_{System}} = \sum_{i=1}^n \frac{1}{\lambda_i}$$

Where,  $\lambda$  is the failure rate of a single unit in the parallel configuration, D is the number of units needed for operation in the parallel configuration and n is the total number of units in the parallel configuration.

### 3 Conditions and Assumption

- 1. Ambient Temperature: **35°C**
- 2. Environment: **GB, GC - Ground Benign, Controlled**
- 3. Model: **BTCV5W**
- 4. Component Quality Level: **Level II**
- 5. Calculation Model: **Telcordia Issue III**
- 6. Calculation Method: **Case 3**

### 4. System Configuration

Key Component		Description	Quantity	Remark
MB	5MZBSWFPNR-SI-11A	MZBSWFP-SI 1.1A	1	
PSU ADP	25EP2-10065D-A3S	PSU ADP 19V 3.42A 65W 100-240V	1	
Memory	25SD4-6002G3-C2S	MEMORY DDR3 SODIMM 1.5V/1.35V 1600 2G CT25664BF160B	2	

### 5. Summary of Result

1. System MTBF Prediction



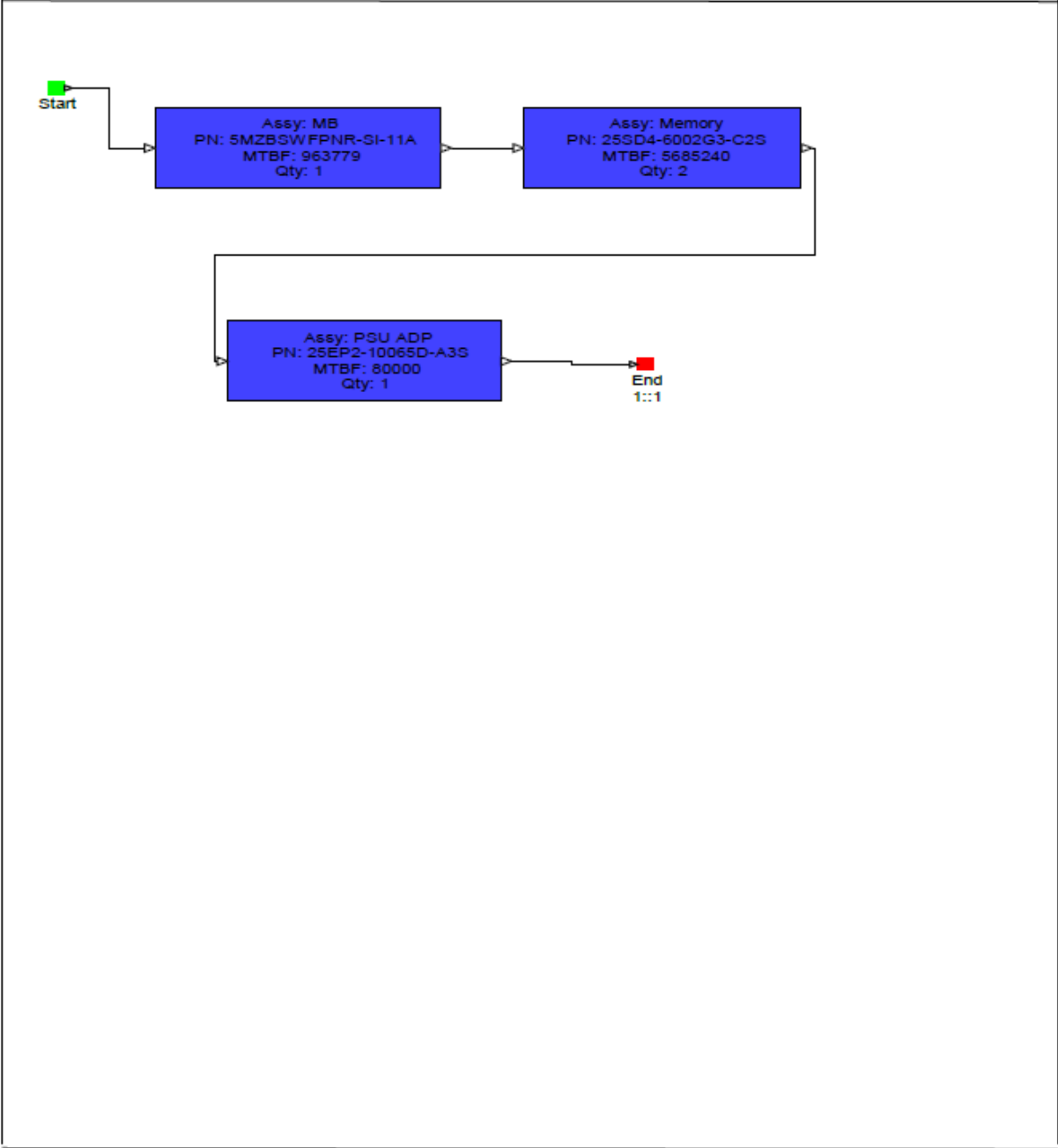
**RBD**  
*Individual Block Details*

File Name: BTCV5W.RPJ  
Configuration: RBD

Assembly	Part Number	Description	Quantity	Failure Distribution	Failure Parameter
MB	5MZBSWFPNR-SI-11A	MZBSWFP-SI 1.1A	1	Exponential	57828740.00
PSU ADP	25EP2-10085D-A3S	PSU ADP 19V 3.42A 85W 100-240V	1	Exponential	4800000.00
Memory	25SD4-8002G3-C2S	MEMORY DDR3 SODIMM 1.5V/1.35V 1600 2G CT25664BF160B	2	Exponential	341114400.00



**RBD  
Diagram**



2. System Prediction of Survival over Time



**RBD  
Calculation Results**

File Name: BTCV5W.RPJ  
 Configuration: RBD  
 Calc Method: TELCORDIA ISSUE III  
 MTBF: 72599.87  
 MTF: 72599.87

Results At Time (hrs): 1000.0  
 Reliability: 0.97900000  
 Availability: 0.97900000  
 No. of Failures:  
 Total Downtime

Time	Reliability	Availability	Unreliability	Unavailability	Failure Rate
.00	1.00000000	1.00000000	0.00000000	0.00000000	14.463202
8760.00	0.88100000	0.88100000	0.11900000	0.11900000	13.607635
17520.00	0.78200000	0.78200000	0.21800000	0.21800000	12.645480
26280.00	0.70000000	0.70000000	0.30000000	0.30000000	12.572351
35040.00	0.62700000	0.62700000	0.37300000	0.37300000	13.309084
43800.00	0.55800000	0.55800000	0.44200000	0.44200000	13.445552
52560.00	0.49600000	0.49600000	0.50400000	0.50400000	15.243310
61320.00	0.43400000	0.43400000	0.56600000	0.56600000	15.770587
70080.00	0.37800000	0.37800000	0.62200000	0.62200000	13.445552
78840.00	0.33600000	0.33600000	0.66400000	0.66400000	16.414143
87600.00	0.29100000	0.29100000	0.70900000	0.70900000	

**3. Conclusion**

MTBF Predictions

System internal Environment Temperature(C)	MTBF (hours)
35	72,599