



**ZIPPY TECHNOLOGY CORP.**

**Mean Time Between Failures  
PREDICTION REPORT**

**MIL-HDBK-217F, Notice 2**

**Product : Redundant Switching Power Supply**

**Model/Type : ZRH2-5AB0K2H(RoHS)(PMBus WP1.2)**

|                    |                                                                                     |            |                                                                                      |
|--------------------|-------------------------------------------------------------------------------------|------------|--------------------------------------------------------------------------------------|
| <b>Approval By</b> |  | 正式資料<br>用章 |  |
| <b>Prepared By</b> |  |            |                                                                                      |

ZIPPY TECHNOLOGY CORP.  
10F.,No.50,MINQUAN RD.,  
XINDIAN DIST.,NEW TAIPEI CITY,TAIWAN,R.O.C.  
RELIABILITY PREDICTION STANDARD REPORT  
(Sorted by Part Number)  
MIL-HDBK-217F, Notice 2

PRED-FIRST (c) Reliability Prediction Program, BJM Engineering Services

Date: APR-03-2019  
End Item Title : ZRH2 SERIES MTBF  
End Item Part Number : ZRH2-5AB0K2H(RoHS)(PMBus WP1.2)  
ZRH2-5AB0K2H(RoHS)(PMBus WP1.2) MTBF : 240,809  
Module Title: ZIPPY TECHNOLOGY CORP  
Module Part Number : ZRH / MTBF  
Power Unit Module : ZRH-2AB0K2(RoHS)(PMBus WP1.2)  
Environmental Condition: GB  
Ambient Temperature: 25°C

#### RELIABILITY MODELING OF REDUNDANT UNITS

##### Two Redundant Units:

Two identical units may be connected in parallel, each capable of supplying the total required output. If one unit fails and can be removed from the system (does not interfere with the operation of the other unit), then the other unit supplies the required output. Using a constant failure rate, the following relations apply.

$$\text{Total Failure Rate}(F) = M \lambda / (3/2) + B \lambda = 5.387527 / (3/2) + 0.560991 = 4.152676$$

$M \lambda$  = Main power failure rate ,  $B \lambda$  = Back plane failure rate

$$\text{ZRH2-5AB0K2H(RoHS)(PMBus WP1.2)(MTBF)} = F / 10^6 \text{ (Hrs)} = 1 / (4.152676 / 10^6) = 240,809$$

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RELIABILITY PREDICTION STANDARD REPORT  
(Sorted by Part Number)  
MIL-HDBK-217F, Notice 2

Date : SEP-07-2017      Time : 16:45:23  
End Item Title : ZRH SERIES MTBF  
End Item Part Number : ZRH-2AB0K2(RoHS)(PMBus WP1.2)  
ZRH-2AB0K2(RoHS)(PMBus WP1.2) MTBF : 185,614  
Module Title : ZIPPY TECHNOLOGY CORP  
Module Part Number : ZRH / MTBF  
Module Reference Designation : ZRH  
Environmental Condition : GB  
Ambient Temperature: 25°C

ZRH-2AB0K2(RoHS)(PMBus WP1.2)

| ITEM<br># | Part<br>Number | Ref<br>Desig | Qual<br>Level | Quant | Individual<br>Failure Rate<br>(F/10 <sup>6</sup> Hrs) | Total<br>Failure Rate<br>(F/10 <sup>6</sup> Hrs) |
|-----------|----------------|--------------|---------------|-------|-------------------------------------------------------|--------------------------------------------------|
| 1         | B106020003     | BOM          | SPECIAL       | 1     | 1.428742                                              | 1.428742                                         |
| 2         | B106020004     | BOM          | SPECIAL       | 1     | 0.229334                                              | 0.229334                                         |
| 3         | B106020006     | BOM          | SPECIAL       | 1     | 0.191658                                              | 0.191658                                         |
| 4         | B200000582     | BOM          | NMIL          | 1     | 0.009454                                              | 0.009454                                         |
| 5         | B200000640     | BOM          | NMIL          | 3     | 0.006522                                              | 0.019566                                         |
| 6         | B200000641     | BOM          | NMIL          | 2     | 0.006522                                              | 0.013044                                         |
| 7         | B200010052     | BOM          | NMIL          | 1     | 0.000337                                              | 0.000337                                         |
| 8         | B200010109     | BOM          | NMIL          | 1     | 0.000723                                              | 0.000723                                         |
| 9         | B200010192     | BOM          | NMIL          | 1     | 0.008014                                              | 0.008014                                         |
| 10        | B200010235     | BOM          | NMIL          | 4     | 0.065527                                              | 0.262108                                         |
| 11        | B200010253     | BOM          | NMIL          | 2     | 0.065527                                              | 0.131054                                         |
| 12        | B200010261     | BOM          | NMIL          | 1     | 0.000290                                              | 0.000290                                         |
| 13        | B200010262     | BOM          | NMIL          | 7     | 0.012629                                              | 0.088403                                         |
| 14        | B200010263     | BOM          | NMIL          | 1     | 0.001343                                              | 0.001343                                         |
| 15        | B200020039     | BOM          | NMIL          | 1     | 0.002332                                              | 0.002332                                         |
| 16        | B200030109     | BOM          | NMIL          | 1     | 0.002308                                              | 0.002308                                         |
| 17        | B200030110     | BOM          | NMIL          | 1     | 0.002308                                              | 0.002308                                         |
| 18        | B200040062     | BOM          | NMIL          | 1     | 0.000870                                              | 0.000870                                         |
| 19        | B200040141     | BOM          | NMIL          | 13    | 0.000253                                              | 0.003289                                         |
| 20        | B200040142     | BOM          | NMIL          | 1     | 0.011646                                              | 0.011646                                         |
| 21        | B200040143     | BOM          | NMIL          | 1     | 0.002465                                              | 0.002465                                         |
| 22        | B200050070     | BOM          | NMIL          | 1     | 0.003013                                              | 0.003013                                         |
| 23        | B200050082     | BOM          | NMIL          | 1     | 0.003013                                              | 0.003013                                         |
| 24        | B200050085     | BOM          | NMIL          | 2     | 0.003013                                              | 0.006026                                         |

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| ITEM<br># | Part<br>Number | Ref<br>Desig | Qual<br>Level | Quant | Individual<br>Failure Rate<br>(F/10 <sup>6</sup> Hrs) | Total<br>Failure Rate<br>(F/10 <sup>6</sup> Hrs) |
|-----------|----------------|--------------|---------------|-------|-------------------------------------------------------|--------------------------------------------------|
| 25        | B200050090     | BOM          | NMIL          | 2     | 0.003013                                              | 0.006026                                         |
| 26        | B200060024     | BOM          | NMIL          | 1     | 0.015643                                              | 0.015643                                         |
| 27        | B200090055     | BOM          | NMIL          | 1     | 0.001476                                              | 0.001476                                         |
| 28        | B200110042     | BOM          | NMIL          | 6     | 0.002210                                              | 0.013260                                         |
| 29        | B200110046     | BOM          | NMIL          | 2     | 0.002896                                              | 0.005792                                         |
| 30        | B200110120     | BOM          | NMIL          | 1     | 0.002896                                              | 0.002896                                         |
| 31        | B200110223     | BOM          | NMIL          | 3     | 0.003039                                              | 0.009117                                         |
| 32        | B200110325     | BOM          | NMIL          | 1     | 0.002896                                              | 0.002896                                         |
| 33        | B200110346     | BOM          | NMIL          | 1     | 0.002896                                              | 0.002896                                         |
| 34        | B200110470     | BOM          | NMIL          | 3     | 0.003716                                              | 0.011148                                         |
| 35        | B200110508     | BOM          | NMIL          | 1     | 0.002210                                              | 0.002210                                         |
| 36        | B200110512     | BOM          | NMIL          | 6     | 0.002210                                              | 0.013260                                         |
| 37        | B200110573     | BOM          | NMIL          | 4     | 0.002319                                              | 0.009276                                         |
| 38        | B200110574     | BOM          | NMIL          | 6     | 0.002319                                              | 0.013914                                         |
| 39        | B200110629     | BOM          | NMIL          | 4     | 0.002319                                              | 0.009276                                         |
| 40        | B200110727     | BOM          | NMIL          | 2     | 0.002210                                              | 0.004420                                         |
| 41        | B200110732     | BOM          | NMIL          | 1     | 0.002026                                              | 0.002026                                         |
| 42        | B200110733     | BOM          | NMIL          | 10    | 0.002026                                              | 0.020260                                         |
| 43        | B200110737     | BOM          | NMIL          | 1     | 0.002210                                              | 0.002210                                         |
| 44        | B200110739     | BOM          | NMIL          | 8     | 0.002026                                              | 0.016208                                         |
| 45        | B200110744     | BOM          | NMIL          | 2     | 0.002026                                              | 0.004052                                         |
| 46        | B200110771     | BOM          | NMIL          | 1     | 0.002026                                              | 0.002026                                         |
| 47        | B200110775     | BOM          | NMIL          | 1     | 0.002026                                              | 0.002026                                         |
| 48        | B200110789     | BOM          | NMIL          | 6     | 0.002210                                              | 0.013260                                         |
| 49        | B200110821     | BOM          | NMIL          | 2     | 0.002126                                              | 0.004252                                         |
| 50        | B200110850     | BOM          | NMIL          | 1     | 0.002126                                              | 0.002126                                         |
| 51        | B200110865     | BOM          | NMIL          | 1     | 0.002026                                              | 0.002026                                         |
| 52        | B200110890     | BOM          | NMIL          | 2     | 0.002026                                              | 0.004052                                         |
| 53        | B200111014     | BOM          | NMIL          | 1     | 0.002026                                              | 0.002026                                         |
| 54        | B200111107     | BOM          | NMIL          | 3     | 0.003716                                              | 0.011148                                         |
| 55        | B200111108     | BOM          | NMIL          | 1     | 0.002605                                              | 0.002605                                         |
| 56        | B200160054     | BOM          | NMIL          | 1     | 0.001469                                              | 0.001469                                         |
| 57        | B200160056     | BOM          | NMIL          | 1     | 0.008899                                              | 0.008899                                         |
| 58        | B200170029     | BOM          | NMIL          | 2     | 0.003721                                              | 0.007442                                         |
| 59        | B200170073     | BOM          | NMIL          | 1     | 0.002424                                              | 0.002424                                         |
| 60        | B200170074     | BOM          | NMIL          | 4     | 0.002840                                              | 0.011360                                         |
| 61        | B200170075     | BOM          | NMIL          | 1     | 0.002424                                              | 0.002424                                         |
| 62        | B200180105     | BOM          | NMIL          | 1     | 0.001845                                              | 0.001845                                         |
| 63        | B200180106     | BOM          | NMIL          | 1     | 0.001845                                              | 0.001845                                         |
| 64        | B200190077     | BOM          | NMIL          | 1     | 0.012538                                              | 0.012538                                         |

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| ITEM<br># | Part<br>Number | Ref<br>Desig | Qual<br>Level | Quant | Individual<br>Failure Rate<br>(F/10 <sup>6</sup> Hrs) | Total<br>Failure Rate<br>(F/10 <sup>6</sup> Hrs) |
|-----------|----------------|--------------|---------------|-------|-------------------------------------------------------|--------------------------------------------------|
| 65        | B200200017     | BOM          | NMIL          | 3     | 0.006356                                              | 0.019068                                         |
| 66        | B200200085     | BOM          | NMIL          | 1     | 0.007553                                              | 0.007553                                         |
| 67        | B200200117     | BOM          | NMIL          | 1     | 0.005546                                              | 0.005546                                         |
| 68        | B200200119     | BOM          | NMIL          | 1     | 0.004827                                              | 0.004827                                         |
| 69        | B200200123     | BOM          | NMIL          | 5     | 0.003413                                              | 0.017065                                         |
| 70        | B200200141     | BOM          | NMIL          | 1     | 0.007820                                              | 0.007820                                         |
| 71        | B200200167     | BOM          | NMIL          | 1     | 0.009620                                              | 0.009620                                         |
| 72        | B200200186     | BOM          | NMIL          | 3     | 0.003189                                              | 0.009567                                         |
| 73        | B200200205     | BOM          | NMIL          | 4     | 0.007820                                              | 0.031280                                         |
| 74        | B200200207     | BOM          | NMIL          | 1     | 0.005166                                              | 0.005166                                         |
| 75        | B200200208     | BOM          | NMIL          | 2     | 0.006356                                              | 0.012712                                         |
| 76        | B200200217     | BOM          | NMIL          | 3     | 0.006356                                              | 0.019068                                         |
| 77        | B200200218     | BOM          | NMIL          | 13    | 0.009620                                              | 0.125060                                         |
| 78        | B200200219     | BOM          | NMIL          | 3     | 0.005166                                              | 0.015498                                         |
| 79        | B200220084     | BOM          | NMIL          | 2     | 0.001294                                              | 0.002588                                         |
| 80        | B200220087     | BOM          | NMIL          | 3     | 0.001125                                              | 0.003375                                         |
| 81        | B200230470     | BOM          | NMIL          | 1     | 0.028457                                              | 0.028457                                         |
| 82        | B200230524     | BOM          | NMIL          | 1     | 0.001991                                              | 0.001991                                         |
| 83        | B200230525     | BOM          | NMIL          | 3     | 0.014229                                              | 0.042687                                         |
| 84        | B200260409     | BOM          | NMIL          | 1     | 0.019936                                              | 0.019936                                         |
| 85        | B200260410     | BOM          | NMIL          | 1     | 0.019936                                              | 0.019936                                         |
| 86        | B200260411     | BOM          | NMIL          | 1     | 0.019936                                              | 0.019936                                         |
| 87        | B200270021     | BOM          | NMIL          | 1     | 0.015000                                              | 0.015000                                         |
| 88        | B200280012     | BOM          | NMIL          | 1     | 0.000623                                              | 0.000623                                         |
| 89        | B200310012     | BOM          | NMIL          | 1     | 0.005232                                              | 0.005232                                         |
| 90        | B210000120     | BOM          | NMIL          | 3     | 0.002026                                              | 0.006078                                         |
| 91        | B210000121     | BOM          | NMIL          | 1     | 0.001565                                              | 0.001565                                         |
| 92        | B210060136     | BOM          | NMIL          | 1     | 0.024396                                              | 0.024396                                         |
| 93        | B210090235     | BOM          | SPECIAL       | 1     | 2.182912                                              | 2.182912                                         |
| 94        | B210160078     | BOM          | NMIL          | 1     | 0.010000                                              | 0.010000                                         |
| 95        | B210192629     | BOM          | NMIL          | 1     | 0.025102                                              | 0.025102                                         |
| 96        | B210192635     | BOM          | NMIL          | 1     | 0.002468                                              | 0.002468                                         |

Total Failure Rate (F/10<sup>6</sup>Hrs) : 5.387527  
Mean Time (in hours) Between Failures (MTBF) : **185,614**