



**ZIPPY TECHNOLOGY CORP.**

# **Mean Time Between Failures PREDICTION REPORT**

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

**Product : Redundant Switching Power Supply**

**Model/Type : M1K2-5AE0K2H(RoHS)(PMBus WP1.2)**

|                    |                       |            |                                                                                                                                                                                     |
|--------------------|-----------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Approval By</b> | <i>Matthew - Chou</i> | 正式資料<br>用章 | A red circular stamp with a double border. Inside, the text '正式資料' (Official Document) is at the top, 'MAR-21-2018' is in the middle, and '研發本部' (R&D Department) is at the bottom. |
| <b>Prepared By</b> | <i>Fain Huan Lin</i>  |            |                                                                                                                                                                                     |

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: MAR-21-2018  
End Item Title : M1K2 SERIES MTBF  
End Item Part Number : M1K2-5AE0K2H(RoHS)(PMBus WP1.2)  
M1K2-5AE0K2H(RoHS)(PMBus WP1.2) MTBF : 228,483  
Module Title: ZIPPY TECHNOLOGY CORP  
Module Part Number : M1K / MTBF  
Power Unit Module : M1K-2AE0K2(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.

$$\text{Total Failure Rate}(F) = M \lambda / (3/2) + B \lambda = 5.771085 / (3/2) + 0.529302 = 4.376692$$

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

$$\text{M1K2-5AE0K2H(RoHS)(PMBus WP1.2)(MTBF)} = F / 10^6 \text{ (Hrs)} = 1 / (4.376692 / 10^6) = 228,483$$

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

Date : MAR-21-2018      Time : 09:17:53  
End Item Title : M1K SERIES MTBF  
End Item Part Number : M1K-2AE0K2(RoHS)(PMBus WP1.2)  
M1K-2AE0K2(RoHS)(PMBus WP1.2) MTBF : 173,278  
Module Title : ZIPPY TECHNOLOGY CORP  
Module Part Number : M1K / MTBF  
Module Reference Designation : M1K  
Environmental Condition : GB  
Ambient Temperature: 25°C

**M1K-2AE0K2(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         | B102330005     | BOM          | SPECIAL       | 1     | 0.089124                                              | 0.089124                                         |
| 2         | B106040004     | BOM          | SPECIAL       | 1     | 0.603179                                              | 0.603179                                         |
| 3         | B106040005     | BOM          | SPECIAL       | 1     | 0.292977                                              | 0.292977                                         |
| 4         | B106040006     | BOM          | SPECIAL       | 1     | 0.064105                                              | 0.064105                                         |
| 5         | B106040007     | BOM          | SPECIAL       | 1     | 0.169055                                              | 0.169055                                         |
| 6         | B106040011     | BOM          | SPECIAL       | 1     | 0.284956                                              | 0.284956                                         |
| 7         | B106040013     | BOM          | SPECIAL       | 1     | 0.261338                                              | 0.261338                                         |
| 8         | B106040015     | BOM          | SPECIAL       | 1     | 0.222399                                              | 0.222399                                         |
| 9         | B200000001     | BOM          | NMIL          | 1     | 0.013289                                              | 0.013289                                         |
| 10        | B200000296     | BOM          | NMIL          | 1     | 0.005248                                              | 0.005248                                         |
| 11        | B200000333     | BOM          | NMIL          | 1     | 0.005806                                              | 0.005806                                         |
| 12        | B200000364     | BOM          | NMIL          | 1     | 0.020588                                              | 0.020588                                         |
| 13        | B200000601     | BOM          | NMIL          | 2     | 0.005806                                              | 0.011612                                         |
| 14        | B200010052     | BOM          | NMIL          | 3     | 0.000337                                              | 0.001011                                         |
| 15        | B200010091     | BOM          | NMIL          | 1     | 0.036974                                              | 0.036974                                         |
| 16        | B200010109     | BOM          | NMIL          | 3     | 0.000723                                              | 0.002169                                         |
| 17        | B200010235     | BOM          | NMIL          | 4     | 0.069459                                              | 0.277836                                         |
| 18        | B200010253     | BOM          | NMIL          | 3     | 0.069459                                              | 0.208377                                         |
| 19        | B200020017     | BOM          | NMIL          | 2     | 0.002332                                              | 0.004664                                         |
| 20        | B200020024     | BOM          | NMIL          | 2     | 0.002332                                              | 0.004664                                         |
| 21        | B200020034     | BOM          | NMIL          | 1     | 0.016175                                              | 0.016175                                         |
| 22        | B200030037     | BOM          | NMIL          | 2     | 0.002308                                              | 0.004616                                         |
| 23        | B200030107     | BOM          | NMIL          | 1     | 0.002308                                              | 0.002308                                         |
| 24        | B200040065     | BOM          | NMIL          | 1     | 0.011646                                              | 0.011646                                         |

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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        | B200040073     | BOM          | NMIL          | 7     | 0.011646                                              | 0.081522                                         |
| 26        | B200040083     | BOM          | NMIL          | 1     | 0.016779                                              | 0.016779                                         |
| 27        | B200040104     | BOM          | NMIL          | 1     | 0.003174                                              | 0.003174                                         |
| 28        | B200040110     | BOM          | NMIL          | 1     | 0.001088                                              | 0.001088                                         |
| 29        | B200050024     | BOM          | NMIL          | 1     | 0.004016                                              | 0.004016                                         |
| 30        | B200050032     | BOM          | NMIL          | 5     | 0.003013                                              | 0.015065                                         |
| 31        | B200050083     | BOM          | NMIL          | 2     | 0.003013                                              | 0.006026                                         |
| 32        | B200060030     | BOM          | NMIL          | 2     | 0.007108                                              | 0.014216                                         |
| 33        | B200090005     | BOM          | NMIL          | 1     | 0.001476                                              | 0.001476                                         |
| 34        | B200110006     | BOM          | NMIL          | 2     | 0.002896                                              | 0.005792                                         |
| 35        | B200110042     | BOM          | NMIL          | 6     | 0.002210                                              | 0.013260                                         |
| 36        | B200110095     | BOM          | NMIL          | 2     | 0.002896                                              | 0.005792                                         |
| 37        | B200110123     | BOM          | NMIL          | 3     | 0.002210                                              | 0.006630                                         |
| 38        | B200110128     | BOM          | NMIL          | 1     | 0.001551                                              | 0.001551                                         |
| 39        | B200110172     | BOM          | NMIL          | 6     | 0.002896                                              | 0.017376                                         |
| 40        | B200110192     | BOM          | NMIL          | 2     | 0.002210                                              | 0.004420                                         |
| 41        | B200110202     | BOM          | NMIL          | 1     | 0.002896                                              | 0.002896                                         |
| 42        | B200110223     | BOM          | NMIL          | 4     | 0.003039                                              | 0.012156                                         |
| 43        | B200110227     | BOM          | NMIL          | 6     | 0.002896                                              | 0.017376                                         |
| 44        | B200110235     | BOM          | NMIL          | 2     | 0.002896                                              | 0.005792                                         |
| 45        | B200110276     | BOM          | NMIL          | 4     | 0.002896                                              | 0.011584                                         |
| 46        | B200110282     | BOM          | NMIL          | 3     | 0.002896                                              | 0.008688                                         |
| 47        | B200110311     | BOM          | NMIL          | 1     | 0.002210                                              | 0.002210                                         |
| 48        | B200110313     | BOM          | NMIL          | 1     | 0.002896                                              | 0.002896                                         |
| 49        | B200110317     | BOM          | NMIL          | 1     | 0.002896                                              | 0.002896                                         |
| 50        | B200110493     | BOM          | NMIL          | 3     | 0.002319                                              | 0.006957                                         |
| 51        | B200110494     | BOM          | NMIL          | 2     | 0.002210                                              | 0.004420                                         |
| 52        | B200110503     | BOM          | NMIL          | 1     | 0.002210                                              | 0.002210                                         |
| 53        | B200110506     | BOM          | NMIL          | 2     | 0.002210                                              | 0.004420                                         |
| 54        | B200110508     | BOM          | NMIL          | 1     | 0.002210                                              | 0.002210                                         |
| 55        | B200110524     | BOM          | NMIL          | 1     | 0.002210                                              | 0.002210                                         |
| 56        | B200110551     | BOM          | NMIL          | 1     | 0.002210                                              | 0.002210                                         |
| 57        | B200110668     | BOM          | NMIL          | 1     | 0.002210                                              | 0.002210                                         |
| 58        | B200120170     | BOM          | NMIL          | 1     | 0.004786                                              | 0.004786                                         |
| 59        | B200120171     | BOM          | NMIL          | 1     | 0.004848                                              | 0.004848                                         |
| 60        | B200160022     | BOM          | NMIL          | 1     | 0.008899                                              | 0.008899                                         |
| 61        | B200170032     | BOM          | NMIL          | 3     | 0.003177                                              | 0.009531                                         |
| 62        | B200170057     | BOM          | NMIL          | 4     | 0.003177                                              | 0.012708                                         |
| 63        | B200180094     | BOM          | NMIL          | 2     | 0.001723                                              | 0.003446                                         |
| 64        | B200180103     | BOM          | NMIL          | 1     | 0.001845                                              | 0.001845                                         |

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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        | B200180104     | BOM          | NMIL          | 1     | 0.001974                                              | 0.001974                                         |
| 66        | B200190065     | BOM          | NMIL          | 1     | 0.010191                                              | 0.010191                                         |
| 67        | B200190098     | BOM          | NMIL          | 1     | 0.004493                                              | 0.004493                                         |
| 68        | B200200057     | BOM          | NMIL          | 1     | 0.008988                                              | 0.008988                                         |
| 69        | B200200153     | BOM          | NMIL          | 2     | 0.005166                                              | 0.010332                                         |
| 70        | B200200156     | BOM          | NMIL          | 6     | 0.006356                                              | 0.038136                                         |
| 71        | B200200158     | BOM          | NMIL          | 1     | 0.004508                                              | 0.004508                                         |
| 72        | B200200166     | BOM          | NMIL          | 4     | 0.006824                                              | 0.027296                                         |
| 73        | B200200203     | BOM          | NMIL          | 1     | 0.003924                                              | 0.003924                                         |
| 74        | B200200204     | BOM          | NMIL          | 3     | 0.007306                                              | 0.021918                                         |
| 75        | B200220010     | BOM          | NMIL          | 1     | 0.003943                                              | 0.003943                                         |
| 76        | B200220021     | BOM          | NMIL          | 1     | 0.003440                                              | 0.003440                                         |
| 77        | B200220082     | BOM          | NMIL          | 3     | 0.001208                                              | 0.003624                                         |
| 78        | B200220084     | BOM          | NMIL          | 2     | 0.001294                                              | 0.002588                                         |
| 79        | B200230277     | BOM          | NMIL          | 1     | 0.002410                                              | 0.002410                                         |
| 80        | B200230381     | BOM          | NMIL          | 2     | 0.007167                                              | 0.014334                                         |
| 81        | B200230417     | BOM          | NMIL          | 3     | 0.001886                                              | 0.005658                                         |
| 82        | B200230443     | BOM          | NMIL          | 1     | 0.001573                                              | 0.001573                                         |
| 83        | B200230488     | BOM          | NMIL          | 3     | 0.021939                                              | 0.065817                                         |
| 84        | B200230491     | BOM          | NMIL          | 3     | 0.013812                                              | 0.041436                                         |
| 85        | B200260231     | BOM          | NMIL          | 1     | 0.014968                                              | 0.014968                                         |
| 86        | B200260407     | BOM          | NMIL          | 1     | 0.021132                                              | 0.021132                                         |
| 87        | B200260417     | BOM          | NMIL          | 1     | 0.014682                                              | 0.014682                                         |
| 88        | B200280012     | BOM          | NMIL          | 1     | 0.000623                                              | 0.000623                                         |
| 89        | B200290011     | BOM          | NMIL          | 2     | 0.002901                                              | 0.005802                                         |
| 90        | B200290015     | BOM          | NMIL          | 2     | 0.011159                                              | 0.022318                                         |
| 91        | B200300284     | BOM          | NMIL          | 1     | 0.004495                                              | 0.004495                                         |
| 92        | B200310023     | BOM          | NMIL          | 1     | 0.005546                                              | 0.005546                                         |
| 93        | B200340045     | BOM          | NMIL          | 1     | 0.022977                                              | 0.022977                                         |
| 94        | B200370051     | BOM          | NMIL          | 1     | 0.001196                                              | 0.001196                                         |
| 95        | B200370069     | BOM          | NMIL          | 1     | 0.001373                                              | 0.001373                                         |
| 96        | B200370081     | BOM          | NMIL          | 2     | 0.000962                                              | 0.001924                                         |
| 97        | B210060136     | BOM          | NMIL          | 1     | 0.024396                                              | 0.024396                                         |
| 98        | B210090234     | BOM          | SPECIAL       | 1     | 2.276868                                              | 2.276868                                         |
| 99        | B210160025     | BOM          | NMIL          | 1     | 0.010000                                              | 0.010000                                         |
| 100       | B210192693     | BOM          | NMIL          | 1     | 0.114499                                              | 0.114499                                         |

Total Failure Rate (F/10<sup>6</sup>Hrs) : 5.771085  
Mean Time (in hours) Between Failures (MTBF) : 173,278