



**ZIPPY TECHNOLOGY CORP.**

**Mean Time Between Failures  
PREDICTION REPORT**

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

**Product : Redundant Switching Power Supply**

**Model/Type : MRZ-5800K2V(RoHS)(PMBus WP1.2)**

|                    |                      |                            |                                                                                      |
|--------------------|----------------------|----------------------------|--------------------------------------------------------------------------------------|
| <b>Approval By</b> | <i>Michael Chang</i> | 正<br>式<br>資<br>料<br>用<br>章 |  |
| <b>Prepared By</b> | <i>Lin 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: OCT-24-2018  
End Item Title : MRZ SERIES MTBF  
End Item Part Number : MRZ-5800K2V(RoHS)(PMBus WP1.2)  
MRZ-5800K2V(RoHS)(PMBus WP1.2) MTBF : 234,548  
Module Title: ZIPPY TECHNOLOGY CORP  
Module Part Number : ZRH / MTBF  
Power Unit Module : ZRH-2800K2(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.

$$\text{Total Failure Rate}(F) = M \lambda / (3/2) + B \lambda = 5.539995 / (3/2) + 0.570197 = 4.263527$$

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

$$\text{MRZ-5800K2V(RoHS)(PMBus WP1.2)(MTBF)} = F / 10^6 \text{ (Hrs)} = 1 / (4.263527 / 10^6) = 234,548$$

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

Date : APR-13-2017      Time : 13:41:56  
End Item Title : ZRH SERIES MTBF  
End Item Part Number : ZRH-2800K2(RoHS)(PMBus WP1.2)  
ZRH-2800K2(RoHS)(PMBus NP1.2) MTBF : 180,506  
Module Title : ZIPPY TECHNOLOGY CORP  
Module Part Number : ZRH / MTBF  
Module Reference Designation : ZRH  
Environmental Condition : GB  
Ambient Temperature: 25°C

ZRH-2800K2(RoHS)(PMBus NP1.2)

| 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         | B105950003     | BOM          | SPECIAL       | 1     | 0.370902                                              | 0.370902                                         |
| 2         | B105950005     | BOM          | SPECIAL       | 1     | 0.634362                                              | 0.634362                                         |
| 3         | B105950007     | BOM          | SPECIAL       | 1     | 0.257539                                              | 0.257539                                         |
| 4         | B105950008     | BOM          | SPECIAL       | 1     | 0.154079                                              | 0.154079                                         |
| 5         | B105950009     | BOM          | SPECIAL       | 1     | 0.675223                                              | 0.675223                                         |
| 6         | B200000001     | BOM          | NMIL          | 1     | 0.013060                                              | 0.013060                                         |
| 7         | B200000388     | BOM          | NMIL          | 1     | 0.014785                                              | 0.014785                                         |
| 8         | B200000558     | BOM          | NMIL          | 1     | 0.013434                                              | 0.013434                                         |
| 9         | B200000603     | BOM          | NMIL          | 1     | 0.012043                                              | 0.012043                                         |
| 10        | B200000620     | BOM          | NMIL          | 1     | 0.013434                                              | 0.013434                                         |
| 11        | B200010052     | BOM          | NMIL          | 2     | 0.000325                                              | 0.000650                                         |
| 12        | B200010109     | BOM          | NMIL          | 4     | 0.000697                                              | 0.002788                                         |
| 13        | B200010192     | BOM          | NMIL          | 1     | 0.008014                                              | 0.008014                                         |
| 14        | B200010249     | BOM          | NMIL          | 1     | 0.000325                                              | 0.000325                                         |
| 15        | B200010250     | BOM          | NMIL          | 3     | 0.064435                                              | 0.193305                                         |
| 16        | B200010253     | BOM          | NMIL          | 2     | 0.065527                                              | 0.131054                                         |
| 17        | B200010254     | BOM          | NMIL          | 2     | 0.065527                                              | 0.131054                                         |
| 18        | B200020024     | BOM          | NMIL          | 1     | 0.002332                                              | 0.002332                                         |
| 19        | B200020034     | BOM          | NMIL          | 1     | 0.016175                                              | 0.016175                                         |
| 20        | B200030069     | BOM          | NMIL          | 2     | 0.002308                                              | 0.004616                                         |
| 21        | B200030107     | BOM          | NMIL          | 1     | 0.002308                                              | 0.002308                                         |
| 22        | B200040035     | BOM          | NMIL          | 1     | 0.001366                                              | 0.001366                                         |
| 23        | B200040065     | BOM          | NMIL          | 2     | 0.011646                                              | 0.023292                                         |
| 24        | B200040073     | BOM          | NMIL          | 4     | 0.011646                                              | 0.046584                                         |

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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        | B200040107     | BOM          | NMIL          | 1     | 0.002994                                              | 0.002994                                         |
| 26        | B200040110     | BOM          | NMIL          | 1     | 0.001026                                              | 0.001026                                         |
| 27        | B200050032     | BOM          | NMIL          | 1     | 0.003013                                              | 0.003013                                         |
| 28        | B200050083     | BOM          | NMIL          | 2     | 0.003013                                              | 0.006026                                         |
| 29        | B200060030     | BOM          | NMIL          | 1     | 0.006706                                              | 0.006706                                         |
| 30        | B200090055     | BOM          | NMIL          | 1     | 0.001476                                              | 0.001476                                         |
| 31        | B200110006     | BOM          | NMIL          | 4     | 0.002925                                              | 0.011700                                         |
| 32        | B200110042     | BOM          | NMIL          | 5     | 0.002194                                              | 0.010970                                         |
| 33        | B200110123     | BOM          | NMIL          | 2     | 0.002194                                              | 0.004388                                         |
| 34        | B200110190     | BOM          | NMIL          | 1     | 0.002925                                              | 0.002925                                         |
| 35        | B200110202     | BOM          | NMIL          | 1     | 0.002925                                              | 0.002925                                         |
| 36        | B200110223     | BOM          | NMIL          | 4     | 0.003086                                              | 0.012344                                         |
| 37        | B200110227     | BOM          | NMIL          | 1     | 0.002925                                              | 0.002925                                         |
| 38        | B200110235     | BOM          | NMIL          | 2     | 0.002925                                              | 0.005850                                         |
| 39        | B200110279     | BOM          | NMIL          | 1     | 0.002194                                              | 0.002194                                         |
| 40        | B200110313     | BOM          | NMIL          | 1     | 0.002925                                              | 0.002925                                         |
| 41        | B200110317     | BOM          | NMIL          | 1     | 0.002925                                              | 0.002925                                         |
| 42        | B200110325     | BOM          | NMIL          | 2     | 0.002925                                              | 0.005850                                         |
| 43        | B200110441     | BOM          | NMIL          | 1     | 0.002925                                              | 0.002925                                         |
| 44        | B200110473     | BOM          | NMIL          | 1     | 0.002925                                              | 0.002925                                         |
| 45        | B200110490     | BOM          | NMIL          | 1     | 0.002194                                              | 0.002194                                         |
| 46        | B200110524     | BOM          | NMIL          | 1     | 0.002194                                              | 0.002194                                         |
| 47        | B200110530     | BOM          | NMIL          | 1     | 0.002194                                              | 0.002194                                         |
| 48        | B200110635     | BOM          | NMIL          | 2     | 0.002194                                              | 0.004388                                         |
| 49        | B200110646     | BOM          | NMIL          | 1     | 0.002194                                              | 0.002194                                         |
| 50        | B200110678     | BOM          | NMIL          | 1     | 0.002194                                              | 0.002194                                         |
| 51        | B200110706     | BOM          | NMIL          | 1     | 0.002194                                              | 0.002194                                         |
| 52        | B200111088     | BOM          | NMIL          | 1     | 0.002925                                              | 0.002925                                         |
| 53        | B200111089     | BOM          | NMIL          | 2     | 0.002925                                              | 0.005850                                         |
| 54        | B200160022     | BOM          | NMIL          | 1     | 0.008899                                              | 0.008899                                         |
| 55        | B200170057     | BOM          | NMIL          | 2     | 0.003168                                              | 0.006336                                         |
| 56        | B200170069     | BOM          | NMIL          | 3     | 0.003168                                              | 0.009504                                         |
| 57        | B200180096     | BOM          | NMIL          | 2     | 0.001907                                              | 0.003814                                         |
| 58        | B200180103     | BOM          | NMIL          | 1     | 0.001845                                              | 0.001845                                         |
| 59        | B200190065     | BOM          | NMIL          | 1     | 0.010191                                              | 0.010191                                         |
| 60        | B200190084     | BOM          | NMIL          | 1     | 0.004493                                              | 0.004493                                         |
| 61        | B200200057     | BOM          | NMIL          | 3     | 0.008984                                              | 0.026952                                         |
| 62        | B200200070     | BOM          | NMIL          | 1     | 0.007074                                              | 0.007074                                         |
| 63        | B200200092     | BOM          | NMIL          | 5     | 0.009616                                              | 0.048080                                         |
| 64        | B200200094     | BOM          | NMIL          | 1     | 0.004506                                              | 0.004506                                         |

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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        | B200200126     | BOM          | NMIL          | 2     | 0.009616                                              | 0.019232                                         |
| 66        | B200200156     | BOM          | NMIL          | 4     | 0.006353                                              | 0.025412                                         |
| 67        | B200200204     | BOM          | NMIL          | 1     | 0.007303                                              | 0.007303                                         |
| 68        | B200210007     | BOM          | NMIL          | 1     | 0.021267                                              | 0.021267                                         |
| 69        | B200220010     | BOM          | NMIL          | 1     | 0.003943                                              | 0.003943                                         |
| 70        | B200220073     | BOM          | NMIL          | 1     | 0.002605                                              | 0.002605                                         |
| 71        | B200220074     | BOM          | NMIL          | 1     | 0.002117                                              | 0.002117                                         |
| 72        | B200220086     | BOM          | NMIL          | 5     | 0.001208                                              | 0.006040                                         |
| 73        | B200230277     | BOM          | NMIL          | 1     | 0.002274                                              | 0.002274                                         |
| 74        | B200230342     | BOM          | NMIL          | 1     | 0.002420                                              | 0.002420                                         |
| 75        | B200230354     | BOM          | NMIL          | 2     | 0.011573                                              | 0.023146                                         |
| 76        | B200230484     | BOM          | NMIL          | 1     | 0.028457                                              | 0.028457                                         |
| 77        | B200230506     | BOM          | NMIL          | 1     | 0.001248                                              | 0.001248                                         |
| 78        | B200230507     | BOM          | NMIL          | 2     | 0.011340                                              | 0.022680                                         |
| 79        | B200240010     | BOM          | NMIL          | 2     | 0.008764                                              | 0.017528                                         |
| 80        | B200250018     | BOM          | NMIL          | 1     | 0.015652                                              | 0.015652                                         |
| 81        | B200260332     | BOM          | NMIL          | 1     | 0.025995                                              | 0.025995                                         |
| 82        | B200260401     | BOM          | NMIL          | 1     | 0.019936                                              | 0.019936                                         |
| 83        | B200280012     | BOM          | NMIL          | 1     | 0.011440                                              | 0.011440                                         |
| 84        | B200290020     | BOM          | NMIL          | 2     | 0.011159                                              | 0.022318                                         |
| 85        | B200300458     | BOM          | NMIL          | 1     | 0.004190                                              | 0.004190                                         |
| 86        | B200300459     | BOM          | NMIL          | 1     | 0.029184                                              | 0.029184                                         |
| 87        | B200310012     | BOM          | NMIL          | 1     | 0.005232                                              | 0.005232                                         |
| 88        | B200360064     | BOM          | NMIL          | 1     | 0.001528                                              | 0.001528                                         |
| 89        | B200370051     | BOM          | NMIL          | 1     | 0.001196                                              | 0.001196                                         |
| 90        | B200370085     | BOM          | NMIL          | 3     | 0.001196                                              | 0.003588                                         |
| 91        | B210060136     | BOM          | NMIL          | 1     | 0.024396                                              | 0.024396                                         |
| 92        | B210090232     | BOM          | SPECIAL       | 1     | 2.182912                                              | 2.182912                                         |
| 93        | B210160002     | BOM          | NMIL          | 1     | 0.010000                                              | 0.010000                                         |
| 94        | B210191722     | BOM          | NMIL          | 1     | 0.000429                                              | 0.000429                                         |
| 95        | B210192570     | BOM          | NMIL          | 1     | 0.017022                                              | 0.017022                                         |
| 96        | B210192577     | BOM          | NMIL          | 1     | 0.003548                                              | 0.003548                                         |

Total Failure Rate (F/10<sup>6</sup>Hrs) : 5.539995  
Mean Time (in hours) Between Failures (MTBF) : **180,506**