

## RELIABILITY PREDICTION STANDARD REPORT

(Sorted by Part Number)

MIL-HDBK-217F, Notice 2

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

Date: JUL-25-2008

End Item Title : MRW SERIES MTBF

End Item Part Number : MRW-5450V4V (RoHS)

MRW-5450V4V (RoHS) MTBF : 162,401

Module Title: ZIPPY TECHNOLOGY CORP

Module Part Number : MRW/MTBF

Power Unit Module : MRW-3450V-R (RoHS)

Environmental Condition: GB

### 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.

$$\begin{aligned}\text{Total Failure Rate}(F) &= M\lambda / (3/2) + B\lambda \\ &= 8.193011 / (3/2) + 0.695583 = 6.157590\end{aligned}$$

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

$$\begin{aligned}\text{MRW-5450V4V (RoHS)(MTBF)} &= F / 10^6 \text{Hrs} = 6.157590 / 10^6 \\ &= 162,401\end{aligned}$$

ZIPPY TECHNOLOGY CORP  
10F,No.50,MIN CHYUAN RD  
SHIN-TIEN,TAIPEI HSIEN,TAIWAN,R.O.C.

|                                           |                                        |                             |              |              |                     |                     |
|-------------------------------------------|----------------------------------------|-----------------------------|--------------|--------------|---------------------|---------------------|
|                                           | RELIABILITY PREDICTION STANDARD REPORT |                             |              |              |                     |                     |
|                                           |                                        | (Sorted by Part Number)     |              |              |                     |                     |
|                                           |                                        | MIL - HDBK - 217F, Notice 2 |              |              |                     |                     |
|                                           |                                        |                             |              |              |                     |                     |
| Date : JUL-25-2008      Time : 14:06:56   |                                        |                             |              |              |                     |                     |
| End Item Title : MRW SERIES MTBF          |                                        |                             |              |              |                     |                     |
| End Item Part Number : MRW-3450V-R (RoHS) |                                        |                             |              |              |                     |                     |
| Module Title : ZIPPY TECHNOLOGY CORP      |                                        |                             |              |              |                     |                     |
| Module Part Number : MRW/MTBF             |                                        |                             |              |              |                     |                     |
| Module Reference Designation : MRW        |                                        |                             |              |              |                     |                     |
| Environmental Condition : GB              |                                        |                             |              |              |                     |                     |
|                                           |                                        |                             |              |              |                     |                     |
|                                           |                                        |                             |              |              |                     |                     |
| <b><u>MRW-3450V-R (RoHS)</u></b>          |                                        |                             |              |              |                     |                     |
|                                           |                                        |                             |              |              |                     |                     |
| <b>ITEM</b>                               | <b>Part</b>                            | <b>Ref</b>                  | <b>Qual</b>  | <b>Quant</b> | <b>Individual</b>   | <b>Total</b>        |
| <b>#</b>                                  | <b>Number</b>                          | <b>Desig</b>                | <b>Level</b> |              | <b>Failure Rate</b> | <b>Failure Rate</b> |
|                                           |                                        |                             |              |              | <b>(F/10^6Hrs)</b>  | <b>(F/10^6Hrs)</b>  |
| 1                                         | B102130002                             | BOM                         | NMIL         | 1            | 0.074349            | 0.074349            |
| 2                                         | B102720004                             | BOM                         | NMIL         | 1            | 0.069564            | 0.069564            |
| 3                                         | B102860002                             | BOM                         | NMIL         | 1            | 0.216158            | 0.216158            |
| 4                                         | B200000058                             | BOM                         | SPECIAL      | 1            | 0.094935            | 0.094935            |
| 5                                         | B200000080                             | BOM                         | SPECIAL      | 2            | 0.094935            | 0.189870            |
| 6                                         | B200000092                             | BOM                         | SPECIAL      | 1            | 0.093036            | 0.093036            |
| 7                                         | B200000144                             | BOM                         | SPECIAL      | 1            | 0.094935            | 0.094935            |
| 8                                         | B200000252                             | BOM                         | SPECIAL      | 1            | 0.094935            | 0.094935            |
| 9                                         | B200000308                             | BOM                         | SPECIAL      | 3            | 0.094935            | 0.284805            |
| 10                                        | B200000309                             | BOM                         | SPECIAL      | 1            | 0.094935            | 0.094935            |
| 11                                        | B200010022                             | BOM                         | NMIL         | 1            | 0.000798            | 0.000798            |
| 12                                        | B200010052                             | BOM                         | NMIL         | 1            | 0.000798            | 0.000798            |
| 13                                        | B200010056                             | BOM                         | NMIL         | 4            | 0.000798            | 0.003192            |
| 14                                        | B200010057                             | BOM                         | NMIL         | 2            | 0.030770            | 0.061540            |
| 15                                        | B200010067                             | BOM                         | NMIL         | 2            | 0.000798            | 0.001596            |
| 16                                        | B200010080                             | BOM                         | NMIL         | 3            | 0.030770            | 0.092310            |
| 17                                        | B200010081                             | BOM                         | NMIL         | 2            | 0.030770            | 0.061540            |
| 18                                        | B200010083                             | BOM                         | NMIL         | 2            | 0.000782            | 0.001564            |
| 19                                        | B200010084                             | BOM                         | NMIL         | 1            | 0.030770            | 0.030770            |
| 20                                        | B200020004                             | BOM                         | NMIL         | 12           | 0.005156            | 0.061872            |
| 21                                        | B200030019                             | BOM                         | NMIL         | 1            | 0.018136            | 0.018136            |

ZIPPY TECHNOLOGY CORP  
10F,No.50,MIN CHYUAN RD  
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|    |            |     |      |   |          |          |
|----|------------|-----|------|---|----------|----------|
| 22 | B200040012 | BOM | NMIL | 1 | 0.005156 | 0.005156 |
| 23 | B200040059 | BOM | NMIL | 1 | 0.005156 | 0.005156 |
| 24 | B200040063 | BOM | NMIL | 1 | 0.017773 | 0.017773 |
| 25 | B200050039 | BOM | NMIL | 1 | 0.005156 | 0.005156 |
| 26 | B200050040 | BOM | NMIL | 3 | 0.005156 | 0.015468 |
| 27 | B200050045 | BOM | NMIL | 1 | 0.005156 | 0.005156 |
| 28 | B200050054 | BOM | NMIL | 1 | 0.114132 | 0.114132 |
| 29 | B200060009 | BOM | NMIL | 1 | 0.019199 | 0.019199 |
| 30 | B200110001 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 31 | B200110021 | BOM | NMIL | 2 | 0.004650 | 0.009300 |
| 32 | B200110042 | BOM | NMIL | 4 | 0.004650 | 0.018600 |
| 33 | B200110046 | BOM | NMIL | 8 | 0.004650 | 0.037200 |
| 34 | B200110120 | BOM | NMIL | 3 | 0.004650 | 0.013950 |
| 35 | B200110131 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 36 | B200110177 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 37 | B200110192 | BOM | NMIL | 2 | 0.004650 | 0.009300 |
| 38 | B200110227 | BOM | NMIL | 2 | 0.004650 | 0.009300 |
| 39 | B200110261 | BOM | NMIL | 2 | 0.004650 | 0.009300 |
| 40 | B200110270 | BOM | NMIL | 3 | 0.004650 | 0.013950 |
| 41 | B200110279 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 42 | B200110282 | BOM | NMIL | 8 | 0.004650 | 0.037200 |
| 43 | B200110303 | BOM | NMIL | 4 | 0.005115 | 0.020460 |
| 44 | B200110317 | BOM | NMIL | 2 | 0.004650 | 0.009300 |
| 45 | B200110321 | BOM | NMIL | 3 | 0.005115 | 0.015345 |
| 46 | B200110356 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 47 | B200110398 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 48 | B200110487 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 49 | B200110489 | BOM | NMIL | 2 | 0.004650 | 0.009300 |
| 50 | B200110503 | BOM | NMIL | 2 | 0.005115 | 0.010230 |
| 51 | B200110506 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 52 | B200110508 | BOM | NMIL | 4 | 0.004650 | 0.018600 |
| 53 | B200110510 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 54 | B200110523 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 55 | B200110525 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 56 | B200110529 | BOM | NMIL | 5 | 0.004650 | 0.023250 |
| 57 | B200110530 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 58 | B200110541 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 59 | B200110544 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 60 | B200110550 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 61 | B200110551 | BOM | NMIL | 2 | 0.004650 | 0.009300 |

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|-----|------------|-----|------|---|----------|----------|
| 62  | B200110553 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 63  | B200110554 | BOM | NMIL | 9 | 0.004650 | 0.041850 |
| 64  | B200110561 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 65  | B200110588 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 66  | B200110600 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 67  | B200110618 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 68  | B200110626 | BOM | NMIL | 1 | 0.004650 | 0.004650 |
| 69  | B200110641 | BOM | NMIL | 1 | 0.005115 | 0.005115 |
| 70  | B200110644 | BOM | NMIL | 2 | 0.004650 | 0.009300 |
| 71  | B200120118 | BOM | NMIL | 1 | 0.018000 | 0.018000 |
| 72  | B200120119 | BOM | NMIL | 1 | 0.016500 | 0.016500 |
| 73  | B200120154 | BOM | NMIL | 1 | 0.019800 | 0.019800 |
| 74  | B200120160 | BOM | NMIL | 1 | 0.016500 | 0.016500 |
| 75  | B200120161 | BOM | NMIL | 1 | 0.016500 | 0.016500 |
| 76  | B200160011 | BOM | NMIL | 1 | 0.021000 | 0.021000 |
| 77  | B200160017 | BOM | NMIL | 1 | 0.021000 | 0.021000 |
| 78  | B200180015 | BOM | N/A  | 1 | 0.008823 | 0.008823 |
| 79  | B200180016 | BOM | N/A  | 1 | 0.008823 | 0.008823 |
| 80  | B200190033 | BOM | N/A  | 1 | 0.019448 | 0.019448 |
| 81  | B200190038 | BOM | N/A  | 1 | 0.019448 | 0.019448 |
| 82  | B200200006 | BOM | N/A  | 4 | 0.007188 | 0.028752 |
| 83  | B200200007 | BOM | N/A  | 1 | 0.007188 | 0.007188 |
| 84  | B200200012 | BOM | N/A  | 1 | 0.009260 | 0.009260 |
| 85  | B200200017 | BOM | N/A  | 3 | 0.011929 | 0.035787 |
| 86  | B200200018 | BOM | N/A  | 2 | 0.011929 | 0.023858 |
| 87  | B200200021 | BOM | N/A  | 2 | 0.015367 | 0.030734 |
| 88  | B200200047 | BOM | N/A  | 1 | 0.008522 | 0.008522 |
| 89  | B200200060 | BOM | N/A  | 2 | 0.013010 | 0.026020 |
| 90  | B200200061 | BOM | N/A  | 3 | 0.008522 | 0.025566 |
| 91  | B200200062 | BOM | N/A  | 1 | 0.007839 | 0.007839 |
| 92  | B200200071 | BOM | N/A  | 1 | 0.006085 | 0.006085 |
| 93  | B200220021 | BOM | N/A  | 1 | 0.002352 | 0.002352 |
| 94  | B200220042 | BOM | N/A  | 1 | 0.012692 | 0.012692 |
| 95  | B200220055 | BOM | N/A  | 1 | 0.010546 | 0.010546 |
| 96  | B200230057 | BOM | N/A  | 1 | 0.031385 | 0.031385 |
| 97  | B200230198 | BOM | N/A  | 5 | 0.055923 | 0.279615 |
| 98  | B200230210 | BOM | N/A  | 2 | 0.048524 | 0.097048 |
| 99  | B200230213 | BOM | N/A  | 4 | 0.027986 | 0.111944 |
| 100 | B200230217 | BOM | N/A  | 2 | 0.041219 | 0.082438 |
| 101 | B200230236 | BOM | N/A  | 1 | 0.016129 | 0.016129 |

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|     |            |     |                                                |   |          |          |
|-----|------------|-----|------------------------------------------------|---|----------|----------|
| 102 | B200230288 | BOM | N/A                                            | 1 | 0.018490 | 0.018490 |
| 103 | B200230350 | BOM | N/A                                            | 3 | 0.141981 | 0.425943 |
| 104 | B200250009 | BOM | NMIL                                           | 1 | 0.081201 | 0.081201 |
| 105 | B200260204 | BOM | NMIL                                           | 1 | 0.086290 | 0.086290 |
| 106 | B200260245 | BOM | NMIL                                           | 1 | 0.086290 | 0.086290 |
| 107 | B200260246 | BOM | NMIL                                           | 1 | 0.086290 | 0.086290 |
| 108 | B200260260 | BOM | NMIL                                           | 1 | 0.086290 | 0.086290 |
| 109 | B200280012 | BOM | NMIL                                           | 1 | 0.015958 | 0.015958 |
| 110 | B200280013 | BOM | NMIL                                           | 2 | 0.015958 | 0.031916 |
| 111 | B200300219 | BOM | NMIL                                           | 1 | 0.021181 | 0.021181 |
| 112 | B200300236 | BOM | NMIL                                           | 1 | 0.021181 | 0.021181 |
| 113 | B200300265 | BOM | NMIL                                           | 1 | 0.021181 | 0.021181 |
| 114 | B200300274 | BOM | NMIL                                           | 1 | 0.021181 | 0.021181 |
| 115 | B200310007 | BOM | NMIL                                           | 1 | 0.029988 | 0.029988 |
| 116 | B210090072 | BOM | KNOWNFR                                        | 2 | 1.915659 | 3.831318 |
| 117 | B210160001 | BOM | N/A                                            | 1 | 0.010000 | 0.010000 |
| 118 | B210190847 | N/A | STANDARD                                       | 1 | 0.022077 | 0.022077 |
|     |            |     |                                                |   |          |          |
|     |            |     |                                                |   |          |          |
|     |            |     | Total Failure Rate (F/10 <sup>6</sup> Hrs) :   |   |          | 8.193011 |
|     |            |     | Mean Time (in hours) Between Failures (MTBF) : |   |          | 122,055  |