

## **Quarterly Reliability Monitoring Results**

## Quarters: Q1/2022 to Q4/2023

Based on structural similarity

| Supplier Nexperia B.V. Name of Laboratory Assembly reliability labs Based on AEC-Q101 Test |                             | User Part Number                                     |             |           |            |           |  |  |
|--|-----------------------------|--|-------------|-----------|------------|-----------|--|--|
|  |                             | BZX84-B24-Q  |             |           |            |           |  |  |
|  |                             | Part Description                                     |             |           |            |           |  |  |
|  |                             | Nexperia DHAM Zener                                  |             |           |            |           |  |  |
|  |                             | SMD package  |             |           |            |           |  |  |
|  |                             | Test Conditions                                      | Duration    | # Lots    | # Quantity | # Rejects |  |  |
|  | TEST                        |  |             |           |            |           |  |  |
|  | Pre- and Post-Stress        |  |             |           |            |           |  |  |
| # E1   | Electrical Test             | Tamb = 25 °C   | N/A         | see below | all parts  | see below |  |  |
|  |                             | JESD22-A113  |             |           |            |           |  |  |
|  |                             | Bake Tamb = 125 °C                                   | 24 hours    |           |            |           |  |  |
|  | PC                          | Soak Tamb = 85 °C, RH = 85%                          | 168 hours   |           |            |           |  |  |
| # A1   | Preconditioning             | Reflow soldering                                     | 3 cycles    | 1514      | 64430      | 0         |  |  |
|  |                             | MIL-STD-750-1  |             |           |            |           |  |  |
|  | HTRB                        | M1038 Method A                                       |             |           |            |           |  |  |
|  |                             | Tj = Tjmax, VR = 80 % of rated reverse               |             |           |            | _         |  |  |
| # B1   | Bias                        | voltage  | 1000 hours  | 250       | 11400      | 0         |  |  |
|  |                             | MIL-STD-750-1  |             |           |            |           |  |  |
|  |                             | M1038 Method B                                       |             |           |            |           |  |  |
|  | SSOP                        | Tj = Tjmax, Iz = 100% of max. datasheet              |             |           |            | _         |  |  |
| # B1b  | Steady State Operational    | reverse current                                      | 1000 hours  | 44        | 1920       | 0         |  |  |
|  | тс                          | JESD22-A104  |             |           |            |           |  |  |
| # A4   | Temperature Cycling         | -65 °C to Timax, not to exceed 150°C                 | 1000 eveles | 211       | 14000      | 0         |  |  |
| # A4   | remperature Cycling         | -03 C to Tjillax, flot to exceed 130 C               | 1000 cycles | 311       | 14080      | 0         |  |  |
|  | UHAST                       | JESD22-A118  |             |           |            |           |  |  |
| # A3 or  | Unbiased HAST               | Tamb = 130 °C, RH = 85 %                             |             |           |            |           |  |  |
| 7 713 01   | Official Control            | JESD22-A102  | - 96 hours  | 311       | 14080      | 0         |  |  |
|  | AC                          | Tamb = 121 °C, RH = 100 %                            |             |           |            |           |  |  |
| # A3 alt   | Autoclave                   | Pressure = 205 kPa (29.7 psia)                       |             |           |            |           |  |  |
| r AJ dit   | , late ella ve              | Tressare Los III a (LST) pola)                       |             |           |            |           |  |  |
|  | НЗТRВ                       | JESD22-A101  |             |           |            |           |  |  |
|  | High Humidity High          | Tamb = 85 °C, RH = 85%, VR = 80 % of                 |             |           |            |           |  |  |
| # A2 alt   |                             | rated reverse voltage <sup>[1]</sup>                 | 1000 hours  | 311       | 14080      | 0         |  |  |
|  | ,                           | MIL-STD-750 Method 1037                              |             |           |            | -         |  |  |
|  | IOL                         | ton = toff, devices powered to insure $\Delta T_j$ = |             |           |            |           |  |  |
| # A5   | Intermittent Operating Life |  | 1000 hours  | 312       | 14120      | 0         |  |  |
|  |                             | ,  |             |           | -          |           |  |  |
|  | RSH                         | JESD22-A111  |             |           |            |           |  |  |
| # C8   | Resistance to Solder Heat   | 260 °C ± 5 °C  | 10 s        | 269       | 8070       | 0         |  |  |
|  | SD                          |  |             |           |            |           |  |  |
| # C10  | Solderability               | J-STD-002  |             | 19        | 6660       | 0         |  |  |

<sup>[1]</sup> The maximum applied voltage is limited by test chamber set up and does not exceed 115V.

## **Calculation of FIT and MTTF**

Test considered for FIT calculation: High Temperature Reverse Bias (HTRB, Test #B1) Confidence level 60%, derated to 55 °C, activation energy 0.7 eV, test time 168 to 1000 hours

| Wafer Fab | Technology | Quantity | Rejects | Failure Rate (FIT) | MTTF (hrs) |
|-----------|------------|----------|---------|--------------------|------------|
| Nexperia  |            |          |         |                    |            |
| DHAM      | Zener      | 11400    | 0       | 0,37               | 2,68E+09   |

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