

Quarterly Reliability Monitoring Results

Quarters: Q1/2022 to Q4/2023

Based on structural similarity

| Supplier | | User Part Number | | | | |
|---------------------------|--|---|-----------------------------------|-----------|------------|-----------|
| Nexperia B.V. | | PUMH13-Q | | | | |
| Name of Laboratory | | Part Description | | | | |
| Assembly reliability labs | | Nexperia DHAM Small Signal Bipolar Transistor SMD package | | | | |
| Based on AEC-Q101 Test | | Test Conditions | Duration | # Lots | # Quantity | # Rejects |
| # E1 | TEST Pre- and Post-Stress Electrical Test | Tamb = 25 °C | N/A | see below | all parts | see below |
| # A1 | PC Preconditioning | JESD22-A113 Bake Tamb = 125 °C Soak Tamb = 85 °C, RH = 85% Reflow soldering | 24 hours 168 hours 3 cycles | 1674 | 70490 | 0 |
| # B1 | HTRB High Temperature Reverse Bias | MIL-STD-750-1 M1039 Method A Tj = Tjmax, Vr = 100% of max. datasheet reverse voltage | 1000 hours | 415 | 18680 | 0 |
| # A4 | TC Temperature Cycling | JESD22-A104 -65 °C to Tjmax, not to exceed 150°C | 1000 cycles | 343 | 15360 | 0 |
| # A3 or | UHAST Unbiased HAST | JESD22-A118 Tamb = 130 °C, RH = 85 % | 96 hours | 362 | 15920 | 0 |
| # A3 alt | AC Autoclave | JESD22-A102 Tamb = 121 °C, RH = 100 % Pressure = 205 kPa (29.7 psia) | | | | |
| # A2 alt | H3TRB High Humidity High Temperature Reverse Bias | JESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage ^[1] | 1000 hours | 343 | 15360 | 0 |
| # A5 | IOL Intermittent Operating Life | MIL-STD-750 Method 1037 ton = toff, devices powered to insure ΔTj = 100 °C for 15000 cycles | 1000 hours | 343 | 15360 | 0 |
| # C8 | RSH Resistance to Solder Heat | JESD22-A111 260 °C ± 5 °C | 10 s | 283 | 8490 | 0 |
| # C10 | SD Solderability | J-STD-002 | | 214 | 6420 | 0 |

[1] 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 | Small Signal Bipolar Transistor | 18680 | 0 | 0,23 | 4,40E+09 |

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