

Quarterly Reliability Monitoring Results

Quarters: Q1/2021 to Q4/2021

Based on structural similarity

| Supplier | User Part Number | | | | |
|---------------------------|---|-----------------------------------|-----------|------------|-----------|
| Nexperia B.V. | TL431CDBZR | | | | |
| Name of Laboratory | Part Description | | | | |
| Assembly reliability labs | Nexperia DHAM Bipolar Analog Power SMD package | | | | |
| Based on AEC-Q100 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 | 71 | 3840 | 0 |
| # A2 | THB Temperature Humidity Bias JESD22-A101 Tamb = 85 °C, RH = 85%, Vref = 0 V, VKA = 36 V | 1000 hours | 12 | 960 | 0 |
| # A3 | AC Autoclave JESD22-A102 Tamb = 121 °C, RH = 100 % Pressure = 205 kPa (29.7 psia) | 96 hours | 12 | 960 | 0 |
| # A4 | TC Temperature Cycling JESD22-A104 -65 °C to +150 °C | 1000 cycles | 12 | 960 | 0 |
| # A5 | IOL Intermittent Operating Life MIL-STD-750 Method 1037 ton = toff = 2 minutes, Ptot = 250 mW to insure ΔTj = 100 °C for 15000 cycles | 1000 hours | 12 | 960 | 0 |
| # B1 | HTOL High Temperature Operating Life Tamb = 150 °C, Vref = 0 V, VKA = 36 V | 1000 hours | 23 | 1840 | 0 |
| # C3 | RSH Resistance to Solder Heat JESD22-A111 / JESD22-B106 260 °C ± 5 °C | 10 s | 12 | 360 | 0 |
| | SD Solderability JESD22-B102 245 °C ± 5 °C | | 705 | 7050 | 0 |

Calculation of FIT and MTF

Test considered for FIT calculation: High Temperature Operating Life (HTOL, 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 | Bipolar Analog Power | 1840 | 0 | 2.31 | 4.33E+08 |

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