

Quarterly Reliability Monitoring Results

Quarters: Q1/2021 to Q4/2021

Based on structural similarity

| | User Part Number | | | | | | |
|-----------------------------|---|---|---|---|---|--|--|
| | NCR401T Part Description | | | | | | |
| boratory | | | | | | | |
| | Nexperia DHAM Small Signal Bipolar Transistor | | | | | | |
| liability labs | SMD package | | | | | | |
| EC-Q101 Test | Test Conditions | Duration | # Lots | # Quantity | # Rejects | | |
| TEST | | | | | | | |
| | | | | | | | |
| Electrical Test | Tamb = 25 °C | N/A | see below | all parts | see below | | |
| | JESD22-A113 Baka Tamb = 135 %C | 24 hours | | | | | |
| PC | | | | | | | |
| Preconditioning | Reflow soldering | 3 cycles | 849 | 61170 | 0 | | |
| | MIL-STD-750-1 | | | | - | | |
| HTRB | M1039 Method A | | | | | | |
| High Temperature Reverse | Tj = Tjmax, Vr = 100% of max. datasheet | | | | | | |
| Bias | reverse voltage | 1000 hours | 202 | 16160 | 0 | | |
| | | | | | | | |
| тс | JESD22-A104 | | | | | | |
| Temperature Cycling | -65 °C to Tjmax, not to exceed 150°C | 1000 cycles | 171 | 13680 | 0 | | |
| | JESD22-A102 | | | | | | |
| | | | | | | | |
| Autoclave | Pressure = 205 kPa (29.7 psia) | 96 hours | 173 | 13840 | 0 | | |
| | | | | | | | |
| | | | | | | | |
| | | 1000 have | 170 | 12040 | 0 | | |
| Temperature Reverse bias | | 1000 nours | 173 | 13840 | 0 | | |
| TO | | | | | | | |
| | | 1000 hours | 107 | 15760 | 0 | | |
| inconnectine operating Life | | 1000 10015 | 197 | 13700 | 0 | | |
| RSH | IFSD22-A111 | | | | | | |
| | | 10 s | 135 | 4050 | 0 | | |
| SD | | 10.0 | 100 | | • | | |
| Solderability | J-STD-002 | | 342 | 3420 | 0 | | |
| | iability labs EC-Q101 Test TEST Pre- and Post-Stress Electrical Test PC Preconditioning HTRB High Temperature Reverse Bias TC Temperature Cycling AC Autoclave H3TRB High Humidity High Temperature Reverse Bias IOL Intermittent Operating Life RSH Resistance to Solder Heat SD | NCR401T boratory Part Description Nexperia DHAM iability labs SMD package EC-Q101 Test Test Conditions TEST Pre- and Post-Stress Electrical Test Tamb = 25 °C PC Soak Tamb = 125 °C PC Soak Tamb = 85 °C, RH = 85% Preconditioning Reflow soldering HTRB MIL-STD-750-1 M1039 Method A High Temperature Reverse Tj = Tjmax, Vr = 100% of max. datasheet reverse voltage TC JESD22-A104 -65 °C to Tjmax, not to exceed 150°C AC Tamb = 121 °C, RH = 100 % Autoclave High Humidity High Temperature Reverse Bias JESD22-A102 Tamb = 121 °C, RH = 100 % Pressure = 205 kPa (29.7 psia) H3TRB High Humidity High Temperature Reverse Bias JESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage ^[11] MIL-STD-750 Method 1037 ton = toff, devices powered to insure ΔTj = 100 °C for 15000 cycles MIL-STD-750 Method 1037 ton = toff, devices powered to insure ΔTj = 100 °C for 15000 cycles RSH Resistance to Solder Heat JESD22-A111 260 °C ± 5 °C | NCR401TboratoryPart Description Nexperia DHAMSmall Signal Eiability labsSMD packageEC-Q101 TestTest ConditionsDurationTEST Pre- and Post-Stress Electrical TestTamb = 25 °CN/AJESD22-A113 Bake Tamb = 125 °C24 hours 168 hoursPC PC PreconditioningSoder Tamb = 85 °C, RH = 85% 168 hours 3 cycles168 hours 3 cyclesHTRB High Temperature Reverse BiasMIL-STD-750-1 (M1039 Method A Tj = Tjmax, Vr = 100% of max. datasheet reverse voltage1000 hoursTC DESD22-A104 Temperature CyclingJESD22-A104 -65 °C to Tjmax, not to exceed 150°C Tamb = 121 °C, RH = 100 % Autoclave1000 cyclesH3TRB High Humidity High Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage ^[11] 1000 hoursIOL Intermittent Operating LifeMIL-STD-750 Method 1037 ton = toff, devices powered to insure ΔTj = 1000 hoursRSH Resistance to Solder HeatJESD22-A111 260 °C ± 5 °C10 s | NCR401T boratory Part Description Nexperia DHAM Small Signal Bipolar Transist jability labs SMD package Duration # Lots EC-Q101 Test Test Conditions Duration # Lots TEST Pre- and Post-Stress Electrical Test Tamb = 25 °C N/A see below JESD22-A113 Bake Tamb = 125 °C 24 hours 56 hours 96 hours 94 hours PC Soak Tamb = 85 °C, RH = 85% 168 hours 96 hours 94 hours HTRB MIL-STD-750-1 1000 hours 202 1000 hours 202 TC JESD22-A104 1000 hours 202 171 JESD22-A102 Tamb = 121 °C, RH = 100 % 1000 hours 173 AC Tamb = 121 °C, RH = 100 % 1000 hours 173 JESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of 173 High Humidity High Tamb = 85 °C, RH = 85%, VR = 80 % of 173 High Humidity High Tamb = 85 °C, RH = 85%, VR = 80 % of 1000 hours 173 IOL Intermittent Operating Life 100 °C for 15000 cycles | $\begin{tabular}{ c c c } \hline NCR401T \\ \hline NCR401T \\ \hline Nexperia DHAM \\ Nexperia DHAM \\ Small Signal Bipolar Transistor \\ \hline Small Signal Bipo$ | | |

[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 | 16160 | 0 | 0.26 | 3.81E+09 |

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