nexperia

Quarterly Reliability Monitoring Results

Quarters: Q1/2022 to Q4/2023 Based on structural similarity

| | User Part Number | | | | | |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| | PMEG3020EXE-Q | | | | | |
| aboratory | Part Description | | | | | |
| | Nexperia DHAM | Schottky | | | | |
| liability labs | SMD package | | | | | |
| · · · · · · · · · · · · · · · · · · · | | | | | | |
| - | | | | | | |
| Pre- and Post-Stress | | | | | | |
| Electrical Test | Tamb = 25 °C | N/A | see below | all parts | see below | |
| | JESD22-A113 | | | · · | | |
| | Bake Tamb = $125 ^{\circ}\text{C}$ | 24 hours | | | | |
| PC | Soak Tamb = 85 °C, RH = 85% | 168 hours | | | | |
| Preconditioning | Reflow soldering | 3 cycles | 1514 | 64430 | 0 | |
| | MIL-STD-750-1 | | | | | |
| HTRB | M1038 Method A | | | | | |
| High Temperature Reverse | | | | | | |
| Bias | reverse voltage ^[1] | 1000 hours | 206 | 9320 | 0 | |
| | | | | | | |
| | JESD22-A104 | | | | | |
| Temperature Cycling | -65 °C to Tjmax, not to exceed 150°C | 1000 cycles | 311 | 14080 | 0 | |
| | 150500 4440 | | | | | |
| | | | | | | |
| Unblased HAST | , | - 96 hours | 311 | 14080 | 0 | |
| | | | | | | |
| | | | | | | |
| Autoclave | Pressure = 205 kPa (29.7 psia) | | | | | |
| | 1ESD22-A101 | | | | | |
| | | | | | | |
| | | 1000 hauna | 211 | 14000 | 0 | |
| Temperature Reverse blas | | 1000 nours | 211 | 14000 | U | |
| 101 | | | | | | |
| | | 1000 hours | 212 | 14120 | 0 | |
| | | 1000 1100/5 | 512 | 14120 | U | |
| RSH | JESD22-A111 | | | | | |
| Resistance to Solder Heat | 260 °C ± 5 °C | 10 s | 269 | 8070 | 0 | |
| SD | | | | | - | |
| Solderability | J-STD-002 | | 222 | 6660 | 0 | |
| 2 | iboratory iiability labs EC-Q101 Test TEST Pre- and Post-Stress Electrical Test PC Preconditioning HTRB High Temperature Reverse Bias TC Temperature Cycling UHAST Unbiased HAST AC Autoclave H3TRB High Humidity High Temperature Reverse Bias IOL Intermittent Operating Life RSH Resistance to Solder Heat SD | boratoryPart Description Nexperia DHAM SMD packageIiability labsSMD packageEC-Q101 TestTest ConditionsTEST Pre- and Post-Stress Electrical TestTamb = 25 °CJESD22-A113 Bake Tamb = 125 °C Soak Tamb = 85 °C, RH = 85% PreconditioningBeflow solderingMIL-STD-750-1 M1038 Method A High Temperature Reverse BiasMIL-STD-750-1 Time, Vr = 100% of max. datasheet reverse voltage ^[1] TC Temperature CyclingJESD22-A104 -65 °C to Tjmax, not to exceed 150°CUHAST Unbiased HASTJESD22-A104 Tamb = 130 °C, RH = 85 %AC AutoclaveJESD22-A102 Tamb = 121 °C, RH = 100 % Pressure = 205 kPa (29.7 psia)H3TRB High Humidity High Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage ^{[1], [2]} MIL-STD-750 Method 1037 ton = toff, devices powered to insure Δ Tj = 100 °C for 15000 cyclesRSH Resistance to Solder Heat SDJESD22-A111 260 °C \pm 5 °C | boratoryPart Description Nexperia DHAM SMD packageSchottkyIability labsSMD packageDurationEC-Q101 TestTest ConditionsDurationTEST Pre- and Post-Stress Electrical TestTamb = 25 °CN/AJESD22-A113 Bake Tamb = 125 °C24 hoursPCSoak Tamb = 85 °C, RH = 85%168 hoursPcconditioningReflow soldering3 cyclesPreconditioningReflow soldering3 cyclesMIL-STD-750-1 HTRB High Temperature ReverseM1038 Method A T = Tjmax, Vr = 100% of max. datasheetBiasreverse voltage ^[1] 1000 hoursTC Temperature CyclingJESD22-A104 -65 °C to Tjmax, not to exceed 150°C1000 cyclesUHAST Unbiased HASTJESD22-A118 Tamb = 130 °C, RH = 85 % JESD22-A10296 hoursAC AutoclaveJESD22-A102 Pressure = 205 kPa (29.7 psia)96 hoursH3TRB High Humidity High Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage ^{[1], [2]} 1000 hoursIOL Intermittent Operating LifeJESD22-A101 Tamb = 65 °C, GR = 85%, VR = 80 % of rated reverse voltage ^{[1], [2]} 1000 hoursRSH Resistance to Solder HeatJESD22-A111 260 °C \pm 5 °C10 s | boratoryPart Description Nexperia DHAMSchottkyliability labsSMD packageDuration# LotsEC-Q101 TestTest ConditionsDuration# LotsTEST Pre- and Post-Stress Electrical TestTamb = 25 °CN/Asee belowJESD22-A113 Bake Tamb = 125 °C24 hours168 hoursPCSoak Tamb = 85 °C, RH = 85%168 hoursPreconditioningReflow soldering3 cycles1514HTRB High Temperature ReverseTj = Tjmax, Vr = 100% of max. datasheet Bias1000 hours206TC Temperature CyclingJESD22-A104 -65 °C to Tjmax, not to exceed 150°C1000 cycles311UHAST Unbiased HASTJESD22-A104 -65 °C to Tjmax, not to exceed 150°C96 hours311AC AutoclaveJESD22-A101 Tamb = 121 °C, RH = 85 % JESD22-A101 Tamb = 121 °C, RH = 85 %, VR = 80 % of rated reverse voltage ^[11] 1000 hours311ML-STD-750 Method 1037 ton = toff, devices powered to insure ΔT j = Intermittent Operating LifeJESD22-A111 Tom > 50 °C to 15000 cycles1000 hours312RSH Resistance to Solder HeatJESD22-A111 260 °C ± 5 °C10 s26950 | bioratoryPart Description Nexperia DHAM Second SDD packageSchottkyBiability labsSchottkyEC-Q101 TestTest ConditionsDuration# Lots# QuantityTEST Pre- and Post-Stress Electrical TestTamb = 25 °CN/Asee belowall partsBake Tamb = 125 °C24 hours24 hours64430PCSoak Tamb = 85 °C, RH = 85%168 hours151464430PreconditioningReflow soldering3 cycles151464430HTRB High Temperature ReverseTj = Tjmax, Vr = 100% of max. datasheet Bias1000 hours2069320TC Temperature CyclingJESD22-A104 -65 °C to Tjmax, not to exceed 150°C1000 cycles31114080UHAST Unbiased HASTJESD22-A102 Tamb = 130 °C, RH = 85% Tamb = 121 °C, RH = 100 % Autoclave96 hours31114080H3TRB High Humidity High Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of Temperature Reverse BiasJESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of Tamb = 130 °C for 15000 cycles1000 hours31114080KSH Resistance to Solder HeatJESD2-A111 260 °C ± 5 °C10 s2698070 | |

The physical limitations of Schottky diodes have to be considered (thermal runaway).
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 | Schottky | 9320 | 0 | 0,46 | 2,19E+09 |

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