

## **Quarterly Reliability Monitoring Results**

Quarters: Q1/2021 to Q4/2021

Based on structural similarity

	User Part Number						
	PUMX1 Part Description						
boratory							
	Nexperia DHAM Small Signal Bipolar Transistor SMD package						
liability labs							
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	241					
PC							
			840	61170	0		
	5	5 676165	049	01170	0		
HTDR							
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						
AC	Tamb = 121 °C, RH = 100 %						
Autoclave	Pressure = 205 kPa (29.7 psia)	96 hours	173	13840	0		
		10001	170	10010			
remperature Reverse Blas		1000 hours	1/3	13840	0		
101							
		1000 hours	107	15760	0		
Internittent Operating Life	100 0101 15000 090105	1000 Hours	191	13/00	U		
RSH	1FSD22-4111						
		10 s	135	4050	0		
		10.3	133	1000	0		
Solderability	J-STD-002		342	3420	0		
	iboratory iiability 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	PUMX1           Iboratory         Part Description Nexperia DHAM           Iiability 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         M1039 Method A           High Temperature Reverse         Ti = 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 % Pressure = 205 kPa (29.7 psia)           H3TRB         JESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage <sup>[1]</sup> High Humidity High Temperature Reverse Bias         Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage <sup>[1]</sup> MIL-STD-750 Method 1037 ton = toff, devices powered to insure ΔTj = 100 °C for 15000 cycles         Tou = toff, devices powered to insure ΔTj = 100 °C for 15000 cycles           RSH Resistance to Solder Heat         JESD22-A111 260 °C ± 5 °C	PUMX1           Iboratory         Part Description Nexperia DHAM         Small Signal E           liability labs         SMD package         EC-Q101 Test         Test Conditions         Duration           TEST Pre- and Post-Stress         Tamb = 25 °C         N/A         JESD22-A113         Bake Tamb = 125 °C         24 hours           PC         Soak Tamb = 85 °C, RH = 85%         168 hours         3 cycles           Preconditioning         Reflow soldering         3 cycles         1000 hours           HTRB         M1L-STD-750-1         M1039 Method A         1000 hours           High Temperature Reverse Bias         Tj = Tjmax, Vr = 100% of max. datasheet reverse voltage         1000 hours           TC         JESD22-A104 -65 °C to Tjmax, not to exceed 150°C         1000 cycles           JESD22-A102         JESD22-A104 -65 °C, RH = 100 %         1000 cycles           AC         Tamb = 121 °C, RH = 100 %         96 hours           H3TRB         JESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage <sup>[11]</sup> 1000 hours           IOL         ton = toff, devices powered to insure ΔTj = Intermittent Operating Life         100 °C for 15000 cycles         1000 hours           RSH         JESD22-A111 Resistance to Solder Heat         260 °C ± 5 °C         10 s	PUMX1           Abboratory         Part Description Nexperia DHAM         Small Signal Bipolar Transist           Ilability labs         SMD package         Fec-Q101 Test         Test Conditions         Duration         # Lots           FEST Pre- and Post-Stress Electrical Test         Tamb = 25 °C         N/A         see below           JESD22-A113 Bake Tamb = 125 °C         24 hours         Small Signal Bipolar Transist           PC         Soak Tamb = 85 °C, RH = 85%         168 hours           Preconditioning         Reflow soldering         3 cycles         849           HTRB         MIL-STD-750-1 MI039 Method A         1000 hours         202           TC         JESD22-A104 reverse voltage         1000 hours         202           AC         Tamb = 121 °C, RH = 100 % Autoclave         JESD22-A104 -65 °C to Tjmax, not to exceed 150°C         1000 hours         171           JESD22-A102 AC         Tamb = 121 °C, RH = 100 % Autoclave         JESD22-A101 Tamb = 85 °C, RH = 85 %, VR = 80 % of rated reverse voltage <sup>[1]</sup> 1000 hours         173           H3TRB High Humidity High Temperature Reverse Bias         JESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage <sup>[1]</sup> 1000 hours         173           KSH Resistance to Solder Heat         JESD22-A111 260 °C ± 5 °C         10 s         135	PUMX1uboratoryPart Description Nexperia DHAM SMD packageSmall Signal Bipolar TransistorItability labsSMD packagePuration# Lots# QuantityTEST Pre- and Post-Stress Electrical TestTamb = 25 °CN/Asee belowall partsPCDiscourt Soak Tamb = 85 °C, RH = 85% Soak Tamb = 85 °C, RH = 85% 168 hours 3 cycles24 hours 168 hours 3 cycles61170HTRB High Temperature ReverseMIL-STD-750-1 Timma, Vr = 100% of max. datasheet reverse voltage1000 hours 1000 hours20216160TC Temperature CyclingJESD22-A104 -65 °C to Tjmax, not to exceed 150°C Tamb = 121 °C, RH = 100 % Fresure 205 kPa (29.7 psia)96 hours17313840H3TRB High Humidity High Temperature Reverse BiasJESD22-A101 Tamb = 25 °C, RH = 80 % of Tated reverse voltage <sup>[1]</sup> 1000 hours17313840KSH Resistance to Solder Heat Resistance to Solder Heat SDJESD2-A111 260 °C ± 5 °C10 s1354050		

[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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