## nexperia

## **Quarterly Reliability Monitoring Results**

Quarters: Q1/2021 to Q4/2021

Based on structural similarity

	User Part Number						
	BFS20W 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		
		2 0,000	042	011/0	U		
HTRB							
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		
Temperature Reverse Blas		1000 hours	173	13840	0		
101							
		1000 hours	107	15760	0		
Internitient Operating Life		1000 Hours	191	13/00	U		
RSH	IESD22-4111						
		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	BFS20W           bboratory         Part Description Nexperia DHAM           liability 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         Tamb = 121 °C, RH = 100% of max. datasheet reverse voltage           TC         JESD22-A104           Temperature Cycling         -65 °C to Tjmax, not to exceed 150°C           AC         Tamb = 121 °C, RH = 100 %           Autoclave         Pressure = 205 kPa (29.7 psia)           High Humidity High Temperature Reverse Bias         JESD22-A101           Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage <sup>[1]</sup> Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage <sup>[1]</sup> High Humidity High Temperature Reverse Bias         JESD22-A101           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           RSH Resistance to Solder Heat         JESD22-A111 260 °C ± 5 °C	BFS20W           Iboratory         Part Description Nexperia DHAM         Small Signal E           liability labs         SMD package         Duration <b>TEST</b> Pre- and Post-Stress Electrical Test         Tamb = 25 °C         N/A           JESD22-A113 Bake Tamb = 125 °C         24 hours           PC         Soak Tamb = 85 °C, RH = 85%         168 hours           Preconditioning         Reflow soldering         3 cycles           HTRB         M1L-STD-750-1         M1039 Method A           High Temperature Reverse Bias         Tj = Tjmax, Vr = 100% of max. datasheet reverse voltage         1000 hours <b>TC</b> Temperature Cycling         JESD22-A104 -65 °C to Tjmax, not to exceed 150°C         1000 cycles <b>AC</b> Autoclave         JESD22-A102 Tamb = 121 °C, RH = 100 % Autoclave         96 hours           H3TRB High Humidity High Temperature Reverse Bias         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 $\Delta$ Tj = Intermittent Operating Life         MIL-STD-750 Method 1037 ton = toff, devices powered to insure $\Delta$ Tj = Intermittent Operating Life         100 °C for 15000 cycles           RSH Resistance to Solder Heat         JESD22-A111 260 °C 5 °C         10 s	BFS20W           abboratory         Part Description Nexperia DHAM         Small Signal Bipolar Transist           liability 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         508 hours         96 hours         949           PC         Soak Tamb = 85 °C, RH = 85%         168 hours         949         949           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         96 hours         173           H3TRB         JESD22-A101 Tamb = 85 °C, RH = 85%, VR = 80 % of rated reverse voltage <sup>[1]</sup> 1000 hours         173           H3TRB         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 to 15000 cycles         1000 hours         197	BFS20W           bboratory         Part Description Nexperia DHAM         Small Signal Bipolar Transistor           Itability labs         SMD package         # Lots         # Quantity           TEST Pre- and Post-Stress Electrical Test         Test Conditions         Duration         # Lots         # Quantity           PC         Soak Tamb = 25 °C         N/A         see below         all parts           Bake Tamb = 125 °C         24 hours         see below         all parts           PC         Soak Tamb = 85 °C, RH = 85%         168 hours         3 cycles         849         61170           HTRB         MIL-STD-750-1 MI039 Method A         MIL-STD-750-1 Tomax, vr = 100% of max. datasheet reverse voltage         1000 hours         202         16160           TC         JESD22-A104 -65 °C to Tjmax, not to exceed 150°C         1000 nours         171         13680           Acc Autoclave         JESD22-A102 Tamb = 121 °C, RH = 100 % rated reverse voltage <sup>[1]</sup> 1000 hours         173         13840           High Humidity High Temperature Reverse Bias         JESD22-A101 Tamb = 85 °C, RH = 80 % of rated reverse voltage <sup>[1]</sup> 1000 hours         173         13840           KSH Resistance to Solder Hea         JESD2-A111 D0 °C for 15000 cycles         100 °C for 15000 cycles         100 °C for 15000 cycles         100 °C for 15		

[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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