

Reliability Monitoring Results

Quarters: Q1/2021 to Q4/2021

Based on structural similarity

Supplier		User Part Number				
Nexperia B.V.		HEF4013BT				
Part Description: Dual D-type flip-flop with set and reset; positive-edge trigger						
Function Family: HEF4000B Process family: Super micron Package family: SO						
JESD47 Test	Test Conditions	Duration	# Lots	# Quantity	# Rejects	
# 1 TEST Pre- and Post-Stress Electrical Test	Tamb = 25 °C	N/A	see below	all parts	see below	
# 2 PC Preconditioning	JESD22-A113 MSL 1	N/A	378	26431	0	
# 5a HTOL EFR High Temperature Operating Life Extrinsic	JESD22-A108 Tj = 150°C VCCMAX ≤ V ≤ 1.2*VCCMAX	48 hours or 168 hours	63	14114	0	
# 5b HTOL IFR High Temperature Operating Life Intrinsic	JESD22-A108 Tj = 150°C VCCMAX ≤ V ≤ 1.2*VCCMAX	≥500 hours	63	3044	0	
# 7 TC Temperature Cycling	JESD22-A104 -65 °C to 150°C	≥500 cycles	49	15770	4	
# 9 uHAST / HAST unbiased or biased High Accelerated Stress Test	JESD22-A101 Tamb = 130 °C, RH = 85%, V = VCCMAX	96 hours	187	10661	0	

Calculation of PPM, FIT and MTTF

Test considered for PPM calculation: High Temperature Operating LifeTest Extrinsic (HTOL EFR, Test # 5a above)

Test considered for FIT and MTTF calculations: High Temperature Operating LifeTest Intrinsic (HTOL IFR, Test # 5b above)

Confidence level 60%, derated to 55 °C, activation energy 0.7 eV, test time 168 to 1000 hours

Product Family	Package Family	Quantity	Rejects	Extrinsic Failure Rate (PPM)	Intrinsic Failure Rate (FIT)	MTTF (hrs)
HEF4000B	SO	3044	0	65	1.2	8.86 E+08