

## Reliability Monitoring Results

**Quarters:** Q1/2022 to Q4/2022

Based on structural similarity

Supplier		User Part Number				
Nexperia B.V.		HEF4013BT				
<b>Part Description:</b> 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	<b>TEST</b> Pre- and Post-Stress Electrical Test	Tamb = 25 °C	N/A	see below	all parts	see below
# 2	<b>PC</b> Preconditioning	JESD22-A113 MSL 1	N/A	460	29380	0
# 5a	<b>HTOL EFR</b> High Temperature Operating Life Extrinsic	JESD22-A108 Tj = 150°C V <sub>CCMAX</sub> ≤ V ≤ 1.2*V <sub>CCMAX</sub>	48 hours or 168 hours	63	14114	0
# 5b	<b>HTOL IFR</b> High Temperature Operating Life Intrinsic	JESD22-A108 Tj = 150°C V <sub>CCMAX</sub> ≤ V ≤ 1.2*V <sub>CCMAX</sub>	≥500 hours	63	3044	0
# 7	<b>TC</b> Temperature Cycling	JESD22-A104 -65 °C to 150°C	≥500 cycles	69	17630	4
# 9	<b>uHAST / HAST</b> unbiased or biased High Accelerated Stress Test	JESD22-A101 Tamb = 130 °C, RH = 85%, V = V <sub>CCMAX</sub>	96 hours	202	11750	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