

## Quarterly Reliability Monitoring Results

Quarters: 04/2018 to 03/2019

Based on structural similarity

Supplier		User Part Number				
Nexperia B.V.		PMBT4401				
Name of Laboratory		Part Description				
Assembly reliability labs		Nexperia DHAM Small Signal Bipolar Transistor SMD package				
AEC-Q101 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 Bake Tamb = 125 °C Soak Tamb = 85 °C, RH = 85% Reflow soldering	24 hours 168 hours 3 cycles	663	47550	0
# 5	<b>HTRB</b> High Temperature Reverse Bias	MIL-STD-750-1 M1038 Method A Tj = Tjmax, Vr = 100% of max. datasheet reverse voltage	1000 hours	154	12320	0
# 7	<b>TC</b> Temperature Cycling	JESD22-A104 -55 °C to Tjmax, not to exceed 150°C	1000 cycles	139	11125	0
# 8	<b>AC</b> Autoclave	JESD22-A102 Tamb = 121 °C, RH = 100 % Pressure = 205 kPa (29.7 psia)	96 hours	136	10880	0
# 9	<b>H3TRB</b> High Humidity High Temperature Reverse Bias	JESD22-A101 Tamb = 85 °C, RH = 85%, VR > 80 % of rated reverse voltage	1000 hours	139	11125	0
# 10	<b>IOL</b> Intermittent Operating Life	MIL-STD-750 Method 1037 ton = toff, devices powered to insure ΔTj = 100 °C for 15000 cycles	1000 hours	139	11120	0
# 20	<b>RSH</b> Resistance to Solder Heat	JESD22-A111 260 °C ± 5 °C	10 s	110	3300	0
# 21	<b>SD</b> Solderability	J-STD-002 Test method B and D		264	2640	0

### Calculation of FIT and MTTF

Test considered for FIT calculation: High Temperature Reverse Bias (HTRB, AEC-Q101 Test # 5)

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	Small Signal Bipolar				
DHAM	Transistor	12320	0	0,34	2,90E+09

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