



Quality and Reliability Report

First Quarter 2010

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Quality and Reliability Report

Overview

Silicon Laboratories is pleased to share this Quality and Reliability Report with our customers and other interested parties. It provides the latest quality performance data along with failure rate estimates and reliability monitor data. These data are collected on a continual basis as qualification, production and reliability monitors are completed. The report is published and updated quarterly to provide customers visibility to the most recent information. The Quality Trend charts on page 5 are shown on a rolling five year basis. All other reports include data from the previous four quarters on a rolling, one year basis.

The report provides data covering:

- Estimates of shipped product quality
- Long-term operating life estimates
- Mean time to failure
- Data retention life estimates
- Reliability monitor results

Silicon Laboratories is registered to ISO 9001:2000, ISO14001:2004, and ISO/TS 16949 (automotive products only) and is committed to quality excellence. That commitment is demonstrated by extensive product and process qualification. Each product goes through extensive qualification tests prior to production release. Silicon Laboratories qualifies integrated circuit products following JEDEC JESD47, *Stress-Test-Driven Qualification of Integrated Circuits*. Once a product is qualified, on-going product quality and reliability is verified through monitoring programs. Monitors are scheduled to periodically sample device families, wafer fab technologies, and package technologies. The results are published in this report. Any failures are used to drive corrective action and process and product improvement.

We hope you find this report useful. Please let us know if you have any specific questions or suggestions.



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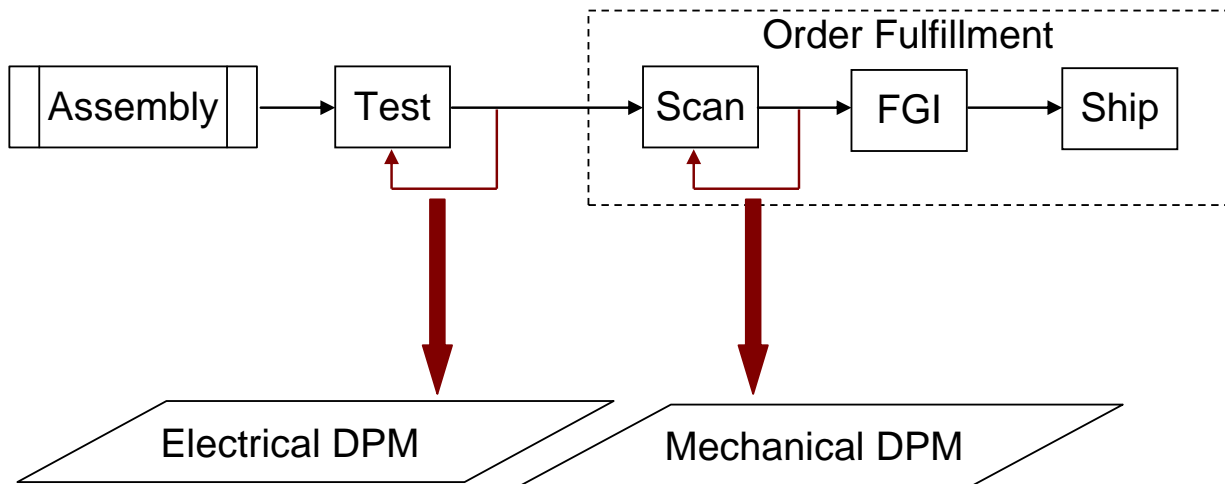
Quality Assurance

Overview

Two elements of product quality are reported – electrical quality and mechanical/visual quality. We measure electrical quality by taking a sample (monitor) of production parts and retesting the sample to the datasheet limits (see Figure 1). The electrical sample test is typically performed at an alternate test temperature to verify part performance across the datasheet temperature range. This sample method identifies defects introduced at the test process step or that have escaped the test process. Any failures drive corrective actions and process/product improvements.

Visual/Mechanical quality is estimated by sample inspection of the completed product prior to final pack. Inspection items cover a broad range and include mark, count, label, cover tape workmanship, moisture barrier bag visual, lead location, part placement, and many other general workmanship items required for customer satisfaction and product protection during shipment. Any failures drive corrective actions and process improvements.

Figure 1 – Quality Monitor Flow

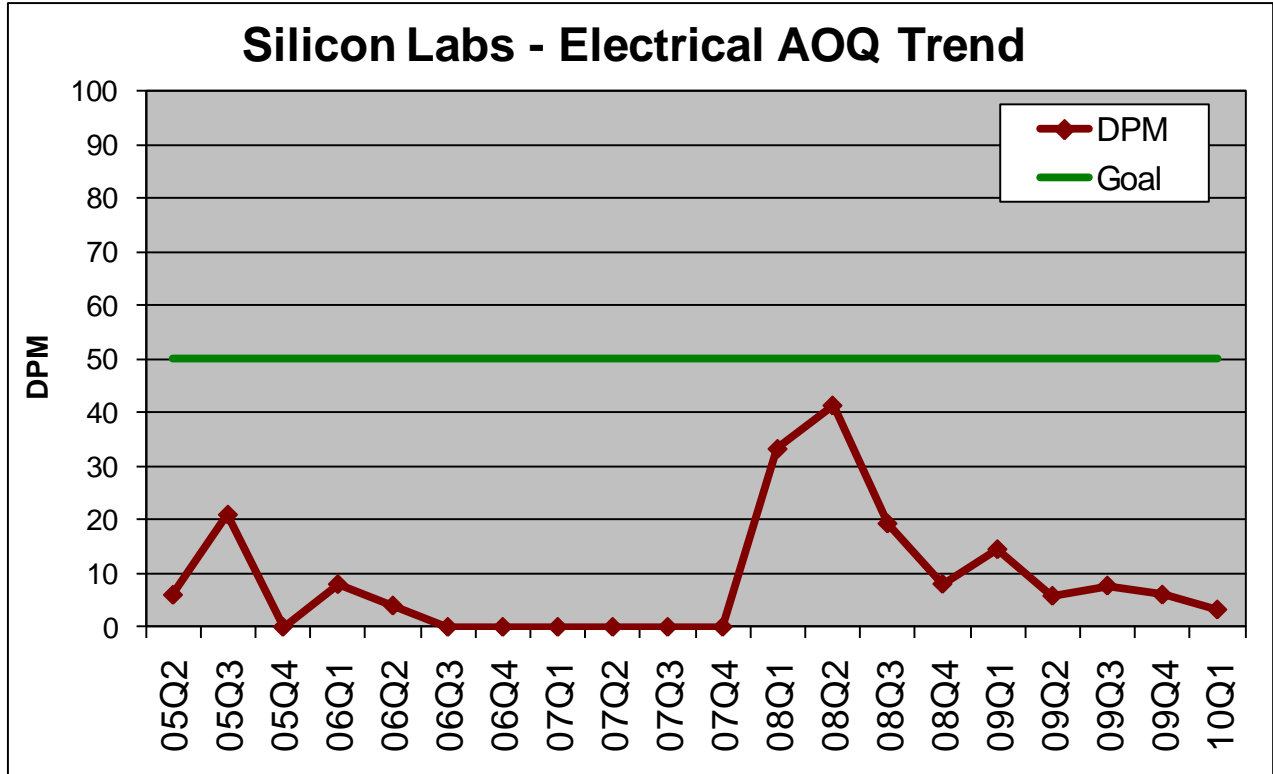


PLEASE NOTE: Shift in reported value beginning 08Q1 is the result of quality monitor reporting that is more closely linked to customer experience.



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Electrical Quality Graph



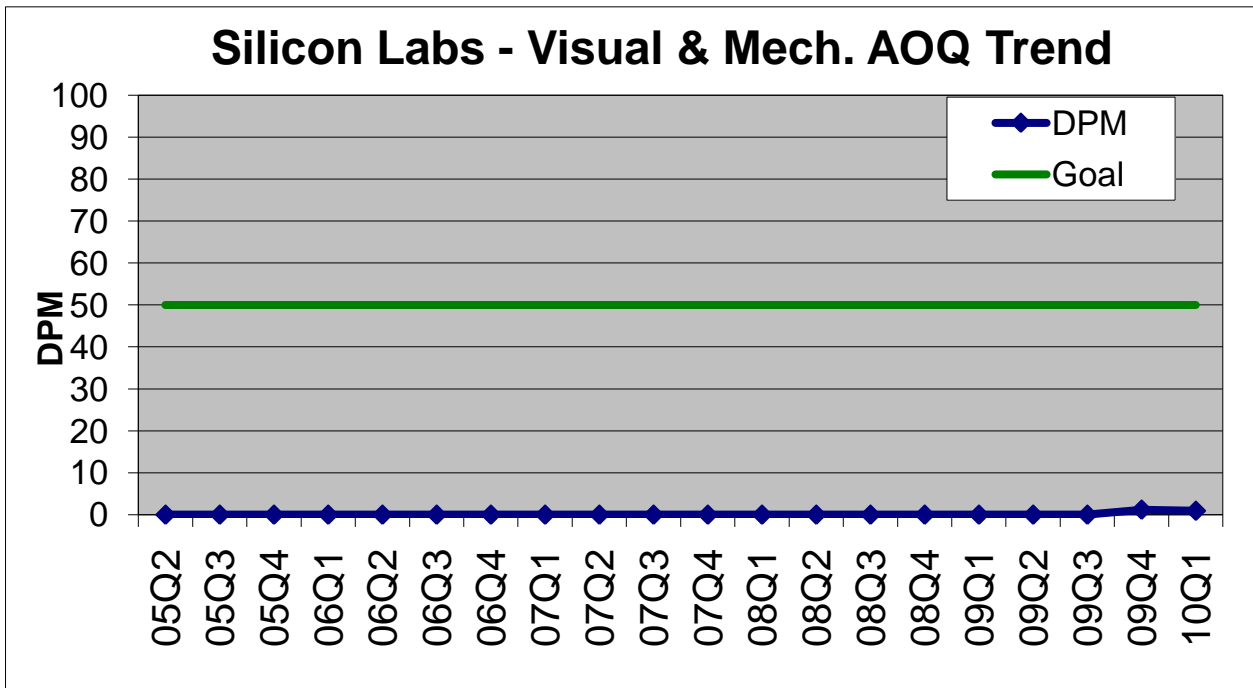
10Q1 Sample size = 10,128,810 dppm = 3

Note: The 2009 Q4 AOQ was previously reported as 42 dppm. Subsequent analysis identified an error in the monitoring methodology which resulted in an error of 36 dppm. The units representing the 36 dppm error were not failing units and the 2009 Q4 data point has been corrected to 6 dppm.



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Visual/Mechanical Quality Graph



10Q1 Sample size = 4,328,735

dppm = 0.9



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Failure Rate Estimation

Failure in Time (FIT)

A long-term, steady-state failure rate is often required by circuit and system engineers for allocations of the failure rates at the component level during system design. FIT, which stands for failure-in-time, is a widely used term to describe failure rates of electronic components, and as used here, represents the number of failures in a billion hours of operation. FIT rates are reported in the following section as curves and in tables for specific set of temperatures and assumptions.

Mean Time To Failure (MTTF)

Another way to express failure rates is by mean time to failure (MTTF). MTTF is the inverse of the FIT rate and is useful for repair and maintenance planning. This relationship can be seen by examining the units of each measure: MTTF is given in time/failure; FIT is given in failure/time. MTTF is reported in the tables following the FIT rate curves for each specific fab technology.

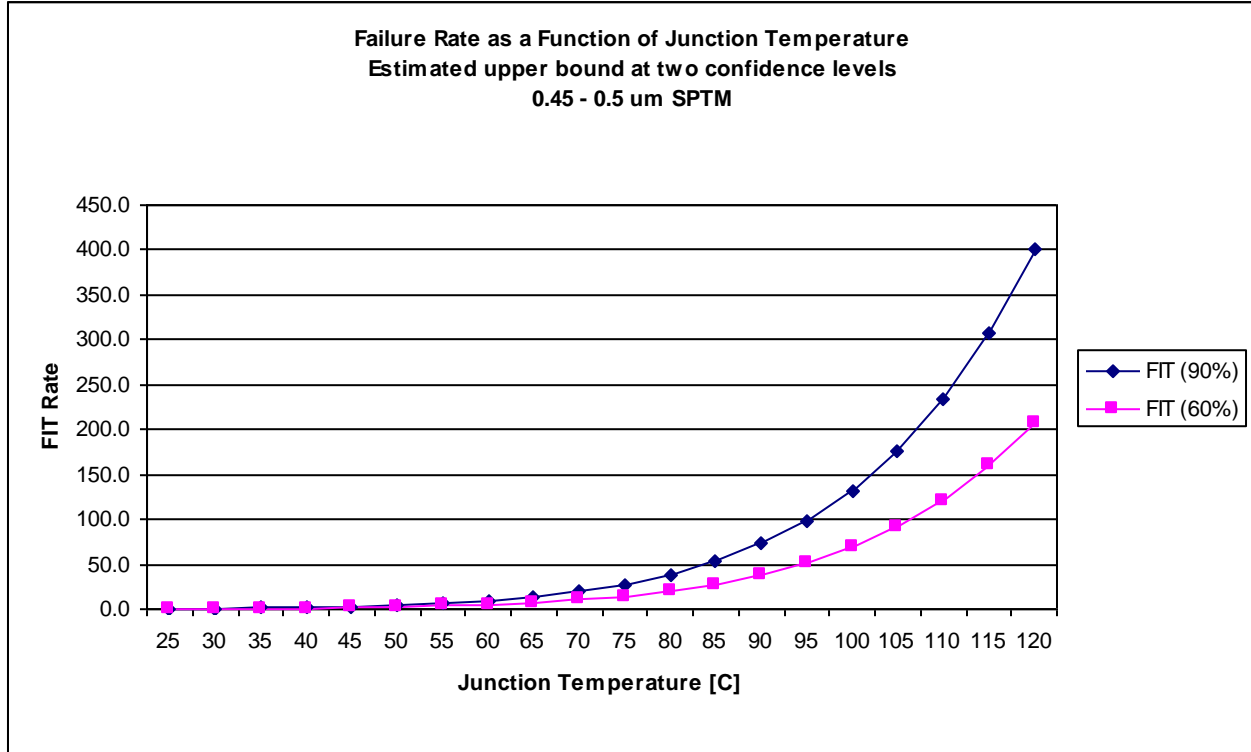
Failure Rate Calculation Method

Long-term failure rates are estimated by applying the Arrhenius equation to data collected from long term operating life tests. A confidence factor is applied based upon the sample size and number of failures to estimate the maximum failure rate at a specific confidence level. The calculation details are provided in the table below each of the following FIT rate curves.



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FIT Rate Curves and Data



Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.45 - 0.5 um:			
<u>Variables:</u>	90%	60%	
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	140	140	Junction Temperature at stress (assume 15C rise)
Ea	0.7	0.7	Energy Activation
D	3573	3573	Devices stressed
H	1000	1000	Number of hours on stress
F	1	1	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
<u>Constants:</u>			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
<u>Calculated Values:</u>			
Af	239.4	239.4	Acceleration Factor: [exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]
v	4.0	4.0	degrees of freedom [2(F+1)]
DH	3573000.0	3573000.0	Total device hours D*H
X2	7.8	4.0	Chi-Square Distribution Value
FIT	4.5	2.4	Failures in time [failures / 1xE9 hours] =[X2/(2*AF*D*H)*1E9]
MTTF	2.2E+08	4.2E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	25100.7	48278.7	Mean Time To Failure [years] (Note: MTTF is 1/FIT)



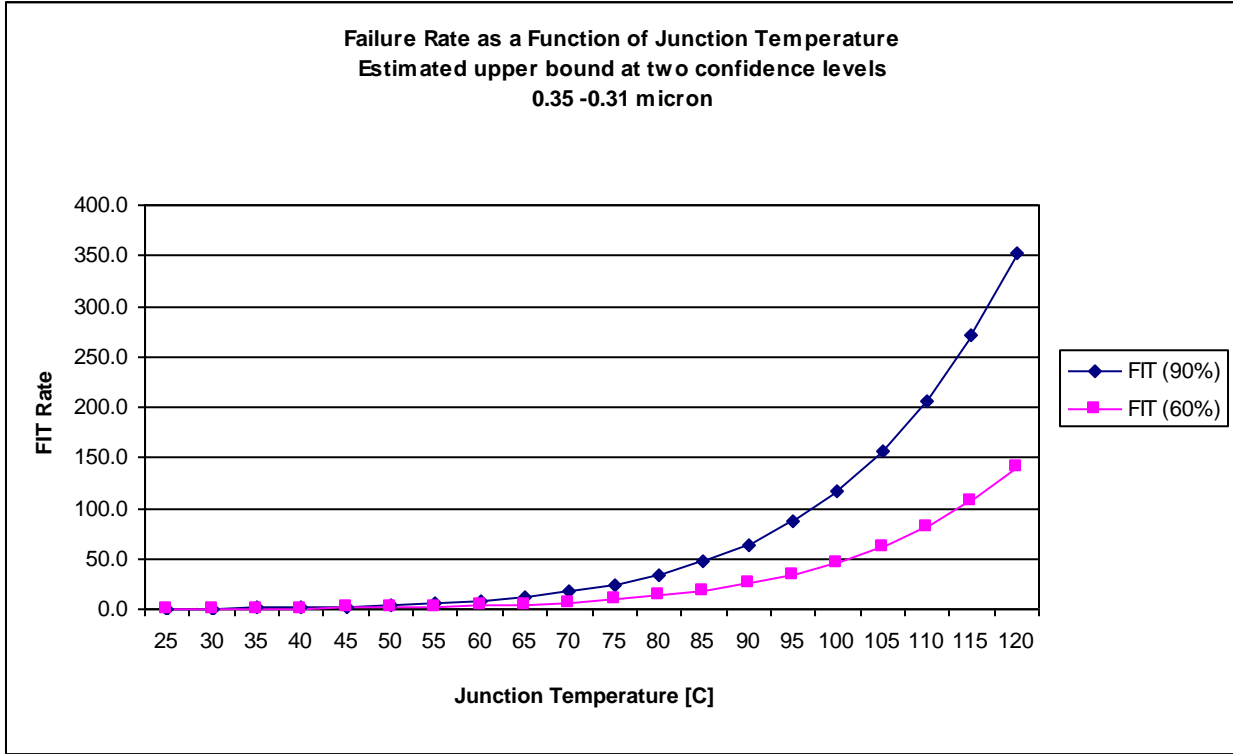
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FIT Estimation Curves for 0.45 - 0.5 um:

<u>Tja</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>MTTF</u>	
				<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1971.6	0.6	0.3	206747	397657
30	1257.7	0.9	0.5	131888	253673
35	814.1	1.3	0.7	85370	164201
40	534.4	2.0	1.1	56033	107773
45	355.4	3.1	1.6	37267	71679
50	239.4	4.5	2.4	25101	48279
55	163.2	6.7	3.5	17111	32912
60	112.5	9.7	5.0	11800	22695
65	78.5	13.9	7.2	8227	15823
70	55.3	19.7	10.2	5796	11149
75	39.3	27.7	14.4	4125	7934
80	28.3	38.5	20.0	2964	5702
85	20.5	53.1	27.6	2150	4135
90	15.0	72.6	37.7	1573	3026
95	11.1	98.3	51.1	1161	2233
100	8.2	132.2	68.7	864	1661
105	6.2	176.3	91.7	648	1245
110	4.7	233.4	121.3	489	941
115	3.5	306.7	159.5	372	716
120	2.7	400.3	208.1	285	549



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.35 - 0.31 um:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	130	130	Junction Temperature at stress (assume 5C rise)
Ea	0.7	0.7	Energy Activation
D	3903	3903	Devices stressed (WT - 468 units)
H	1000	1000	Number of hours on stress
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	147.0	147.0	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - 1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	3903000.0	3903000.0	Total device hours D*H
X2	4.6	1.8	Chi-Square Distribution Value
FIT	4.0	1.6	Failures in time [failures / 1xE9 hours] = $[X2/(2*AF*D*H)*1E9]$
MTTF	2.5E+08	6.3E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	28435.9	71457.8	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

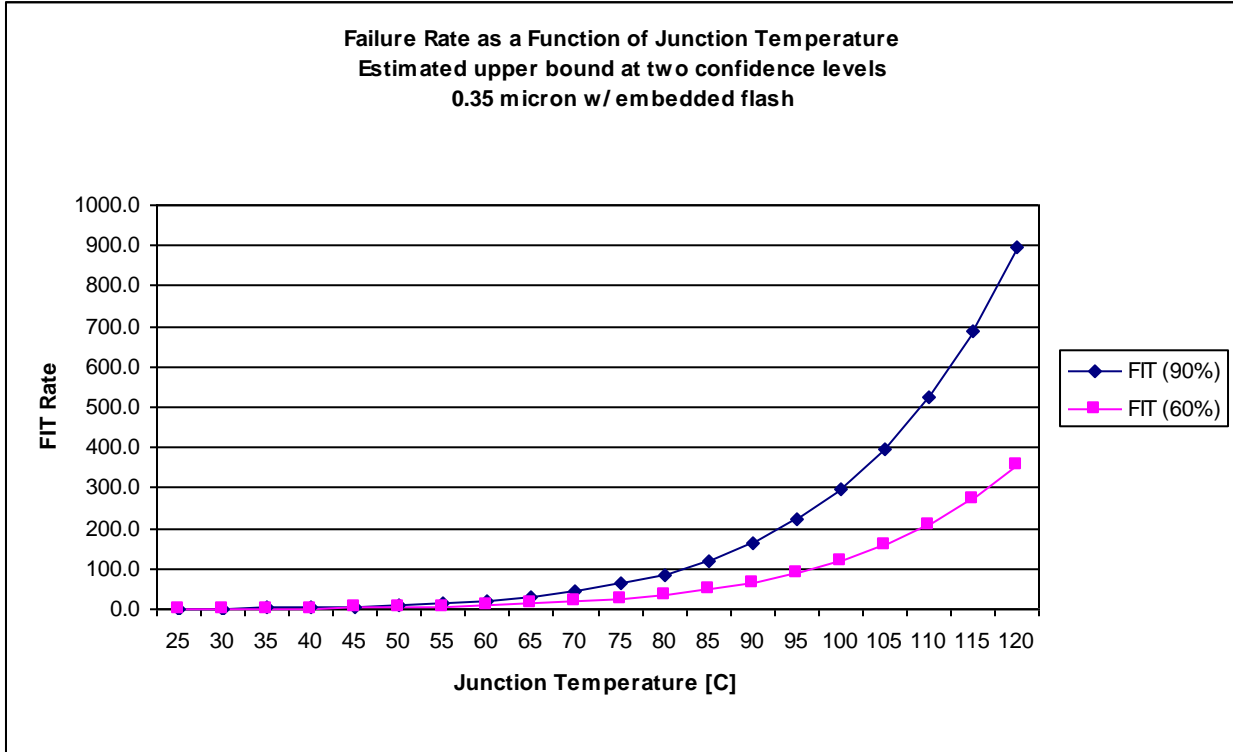


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FIT Estimation Curves for 0.35 - 0.31 um:				<u>MTTF</u>	<u>MTTF</u>
<u>T_{ja}</u>	<u>A_f</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1210.4	0.5	0.2	234218	588576
30	772.2	0.8	0.3	149412	375465
35	499.8	1.2	0.5	96714	243036
40	328.1	1.8	0.7	63478	159516
45	218.2	2.7	1.1	42219	106093
50	147.0	4.0	1.6	28436	71458
55	100.2	5.9	2.3	19385	48713
60	69.1	8.5	3.4	13367	33592
65	48.2	12.2	4.9	9320	23420
70	33.9	17.4	6.9	6567	16501
75	24.2	24.4	9.7	4673	11744
80	17.4	34.0	13.5	3358	8439
85	12.6	46.9	18.7	2436	6120
90	9.2	64.1	25.5	1782	4478
95	6.8	86.8	34.5	1315	3305
100	5.1	116.7	46.4	978	2458
105	3.8	155.6	61.9	734	1843
110	2.9	206.0	82.0	554	1393
115	2.2	270.7	107.7	422	1060
120	1.7	353.3	140.6	323	812



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.35 um w/ embedded flash:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	130	130	Junction Temperature at stress (assume 5C rise)
Ea	0.7	0.7	Energy Activation
D	1537	1537	Devices stressed
H	1000	1000	Various hours on stress (168 to 1000hrs)
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	147.0	147.0	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	1537000.0	1537000.0	Total device hours: sum (D*H)
X2	4.6	1.8	Chi-Square Distribution Value
FIT	10.2	4.1	Failures in time [failures / 1xE9 hours] $= [X2 / (2*AF*D*H)] * 1E9$
MTTF	9.8E+07	2.5E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	11198.0	28140.0	Mean Time To Failure [years] (Note: MTTF is 1/FIT)



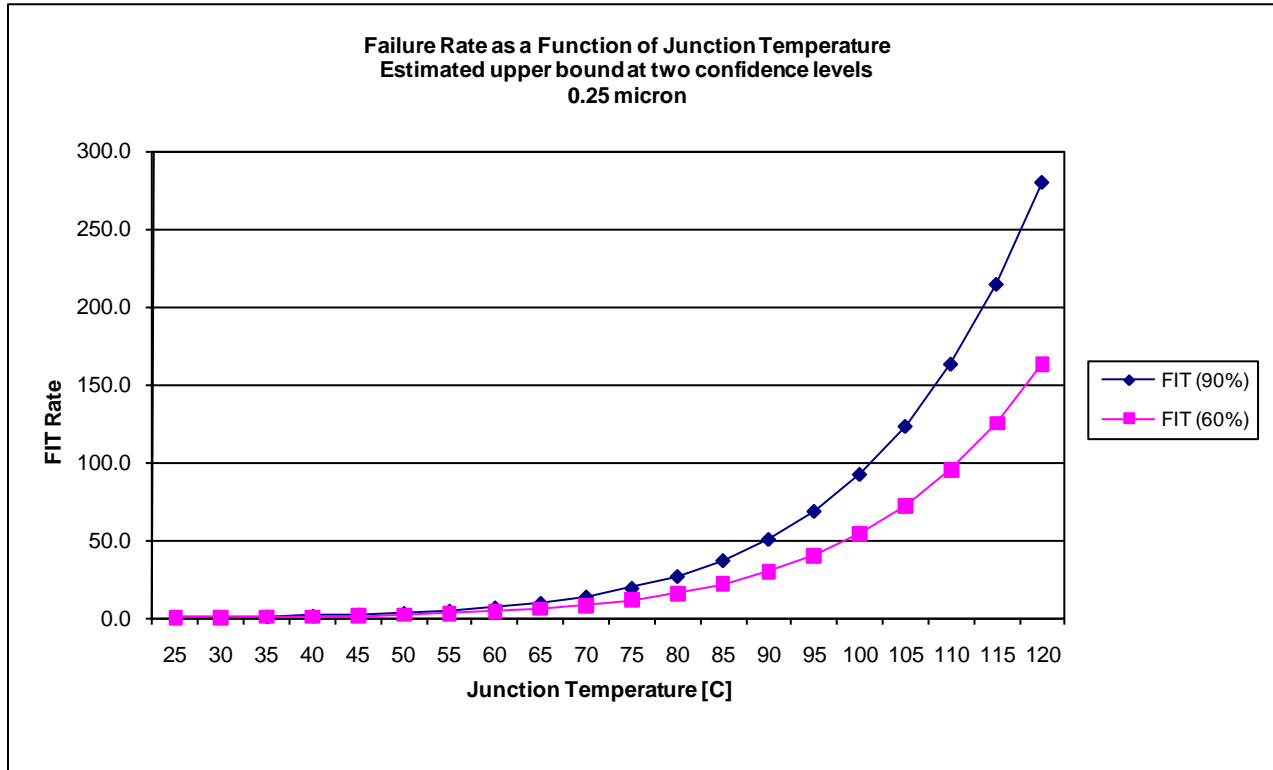
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FIT Estimation Curves for 0.35 um w/ embedded flash:

<u>Tja</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>MTTF</u>	
				<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1210.4	1.2	0.5	92235	231781
30	772.2	1.9	0.8	58839	147858
35	499.8	3.0	1.2	38086	95708
40	328.1	4.6	1.8	24998	62817
45	218.2	6.9	2.7	16626	41779
50	147.0	10.2	4.1	11198	28140
55	100.2	15.0	6.0	7634	19183
60	69.1	21.7	8.6	5264	13228
65	48.2	31.1	12.4	3670	9223
70	33.9	44.1	17.6	2586	6498
75	24.2	62.0	24.7	1840	4625
80	17.4	86.3	34.4	1322	3323
85	12.6	119.0	47.4	959	2410
90	9.2	162.7	64.7	702	1764
95	6.8	220.4	87.7	518	1301
100	5.1	296.3	117.9	385	968
105	3.8	395.2	157.3	289	726
110	2.9	523.1	208.2	218	548
115	2.2	687.5	273.6	166	417
120	1.7	897.2	357.0	127	320



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.25 um:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	140	140	Junction Temperature at stress (assume 15C rise)
Ea	0.7	0.7	Energy Activation
D	7000	7000	Devices stressed
H	1000	1000	Number of hours on stress
F	2	2	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	239.4	239.4	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	6.0	6.0	degrees of freedom $[2(F+1)]$
DH	7000000.0	7000000.0	Total device hours D*H
X2	10.6	6.2	Chi-Square Distribution Value
FIT	3.2	1.9	Failures in time [failures / 1xE9 hours] $= [X2 / (2*AF*D*H)*1E9]$
MTTF	3.1E+08	5.4E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	35939.1	61596.2	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

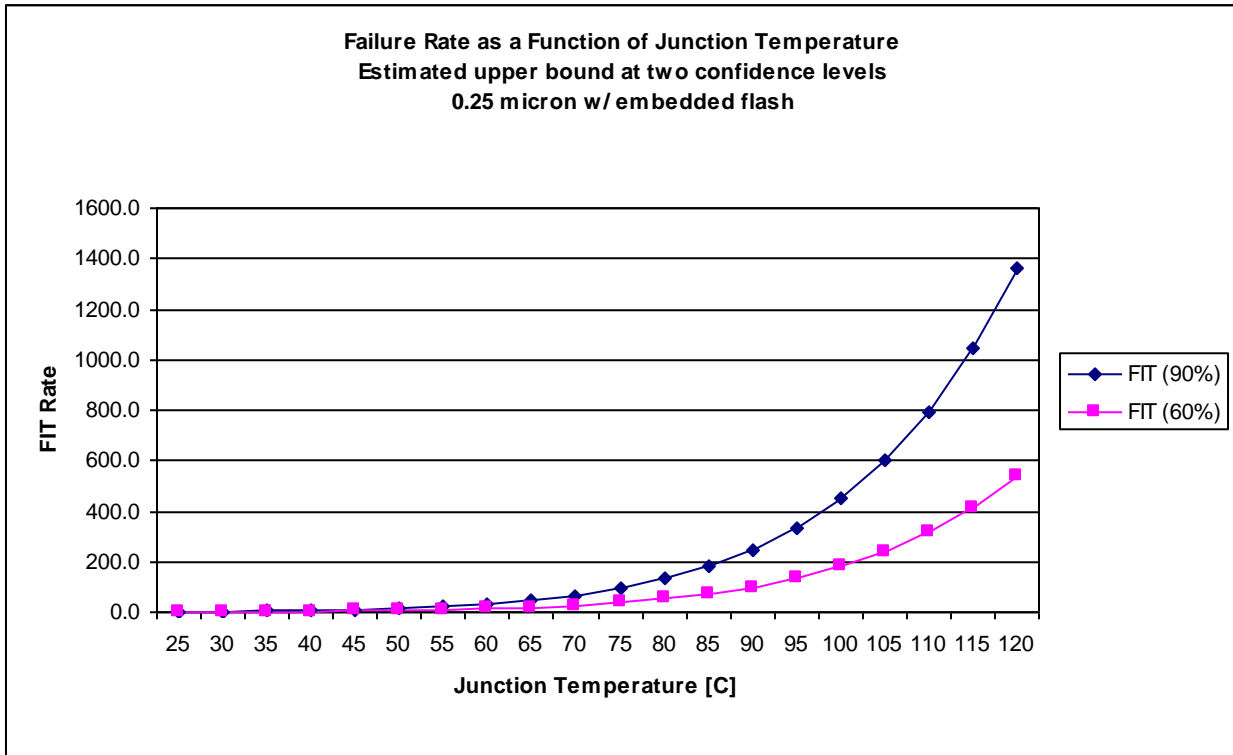


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FIT Estimation Curves for 0.25 um:				<u>MTTF</u>	<u>MTTF</u>
<u>Tja</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1971.6	0.4	0.2	296020	507350
30	1257.7	0.6	0.4	188837	323648
35	814.1	0.9	0.5	122233	209496
40	534.4	1.4	0.8	80227	137502
45	355.4	2.1	1.2	53359	91452
50	239.4	3.2	1.9	35939	61596
55	163.2	4.7	2.7	24500	41990
60	112.5	6.8	3.9	16895	28956
65	78.5	9.7	5.7	11779	20188
70	55.3	13.8	8.0	8299	14224
75	39.3	19.3	11.3	5907	10123
80	28.3	26.9	15.7	4244	7274
85	20.5	37.1	21.6	3078	5276
90	15.0	50.7	29.6	2252	3860
95	11.1	68.7	40.1	1662	2849
100	8.2	92.3	53.9	1236	2119
105	6.2	123.1	71.8	927	1589
110	4.7	163.0	95.1	700	1200
115	3.5	214.2	125.0	533	913
120	2.7	279.5	163.1	408	700



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.25 um w/ embedded flash:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	135	135	Junction Temperature at stress (assume 10C rise)
Ea	0.7	0.7	Energy Activation
D	792	792	Devices stressed
H	1000	1000	Number of hours on stress
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	188.1	188.1	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	792000.0	792000.0	Total device hours D*H
X2	4.6	1.8	Chi-Square Distribution Value
FIT	15.5	6.2	Failures in time [failures / 1xE9 hours] $= [X2 / (2*AF*D*H)*1E9]$
MTTF	6.5E+07	1.6E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	7386.4	18561.7	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

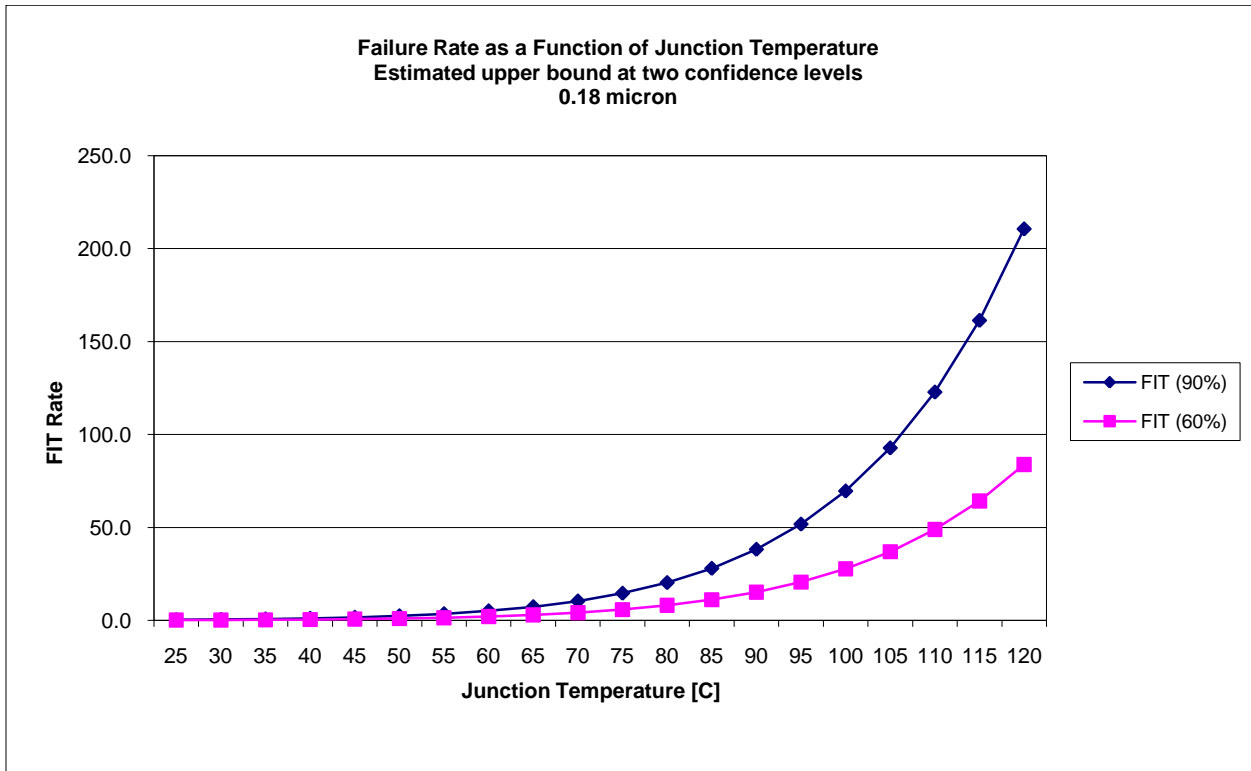


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FIT Estimation Curves for 0.25 um w/ embedded flash:					
<u>Tia</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>MTTF</u> <u>90% (yrs)</u>	<u>MTTF</u> <u>60% (yrs)</u>
25	1549.5	1.9	0.7	60840	152887
30	988.4	2.9	1.2	38811	97530
35	639.8	4.5	1.8	25122	63130
40	419.9	6.9	2.8	16489	41435
45	279.3	10.4	4.1	10967	27558
50	188.1	15.5	6.2	7386	18562
55	128.2	22.7	9.0	5035	12653
60	88.4	32.9	13.1	3472	8726
65	61.7	47.2	18.8	2421	6084
70	43.4	66.9	26.6	1706	4286
75	30.9	94.0	37.4	1214	3051
80	22.2	130.9	52.1	872	2192
85	16.1	180.4	71.8	633	1590
90	11.8	246.6	98.1	463	1163
95	8.7	334.2	133.0	342	858
100	6.5	449.2	178.8	254	639
105	4.9	599.1	238.4	191	479
110	3.7	793.0	315.6	144	362
115	2.8	1042.2	414.7	110	275
120	2.1	1360.1	541.3	84	211



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.18 um:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	135	135	Junction Temperature at stress (assume 10C rise)
Ea	0.7	0.7	Energy Activation
D	5113	5113	Devices stressed
H	1000	1000	Number of hours on stress
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	188.1	188.1	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	5113000.0	5113000.0	Total device hours D*H
X2	4.6	1.8	Chi-Square Distribution Value
FIT	2.4	1.0	Failures in time [failures / 1xE9 hours] $= [X2 / (2*AF*D*H)*1E9]$
MTTF	4.2E+08	1.0E+09	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	47685.4	119830.6	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

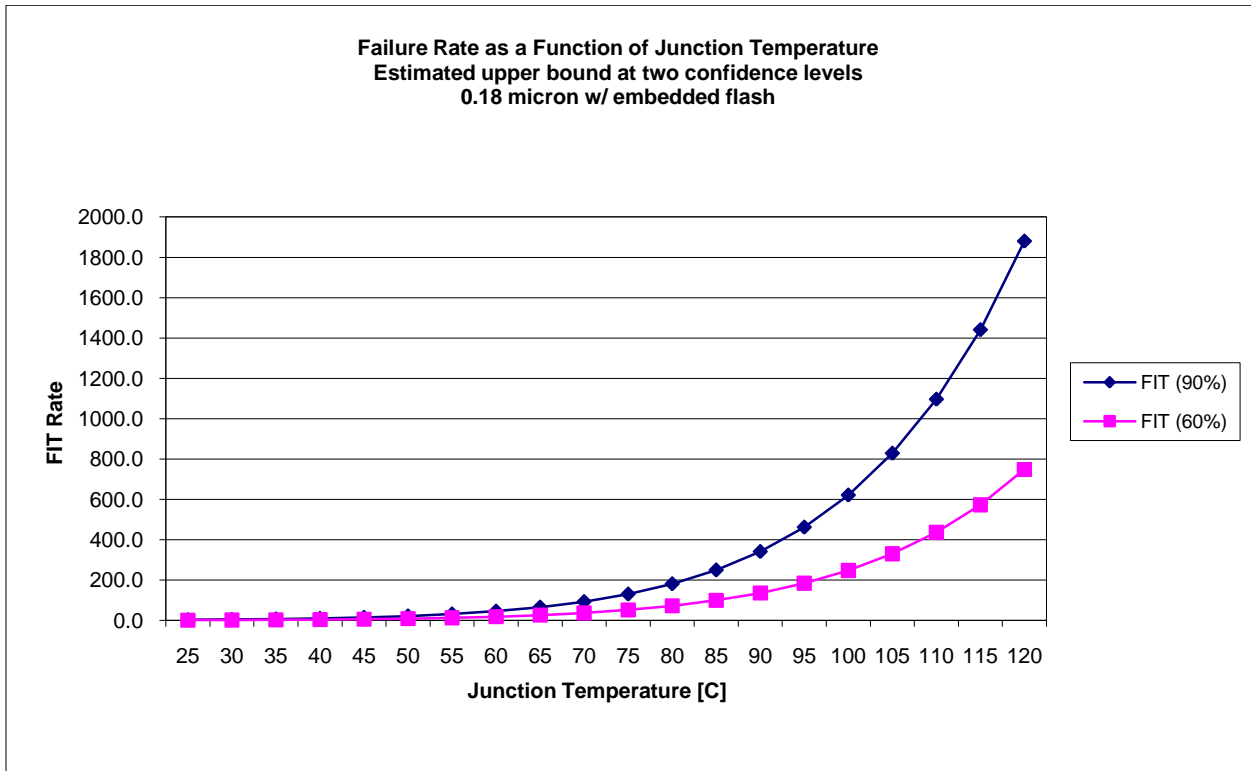


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FIT Estimation Curves for 0.18 um:				<u>MTTF</u>	<u>MTTF</u>
<u>Tja</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1549.5	0.3	0.1	392770	987009
30	988.4	0.5	0.2	250556	629633
35	639.8	0.7	0.3	162184	407558
40	419.9	1.1	0.4	106449	267500
45	279.3	1.6	0.6	70798	177912
50	188.1	2.4	1.0	47685	119831
55	128.2	3.5	1.4	32507	81689
60	88.4	5.1	2.0	22416	56331
65	61.7	7.3	2.9	15629	39275
70	43.4	10.4	4.1	11012	27672
75	30.9	14.6	5.8	7837	19694
80	22.2	20.3	8.1	5632	14152
85	16.1	28.0	11.1	4084	10263
90	11.8	38.2	15.2	2988	7510
95	8.7	51.8	20.6	2205	5542
100	6.5	69.6	27.7	1641	4123
105	4.9	92.8	36.9	1230	3091
110	3.7	122.8	48.9	929	2335
115	2.8	161.4	64.2	707	1777
120	2.1	210.7	83.8	542	1362



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.18 um w/ embedded flash:

<u>Variables:</u>	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	135	135	Junction Temperature at stress (assume 10C rise)
Ea	0.7	0.7	Energy Activation
D	573	573	Devices stressed
H	1000	1000	Number of hours on stress
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
<u>Constants:</u>			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
<u>Calculated Values:</u>			
Af	188.1	188.1	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	573000.0	573000.0	Total device hours D*H
X2	4.6	1.8	Chi-Square Distribution Value
FIT	21.4	8.5	Failures in time [failures / 1xE9 hours] $= [X2 / (2*AF*D*H)*1E9]$
MTTF	4.7E+07	1.2E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	5344.0	13429.1	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

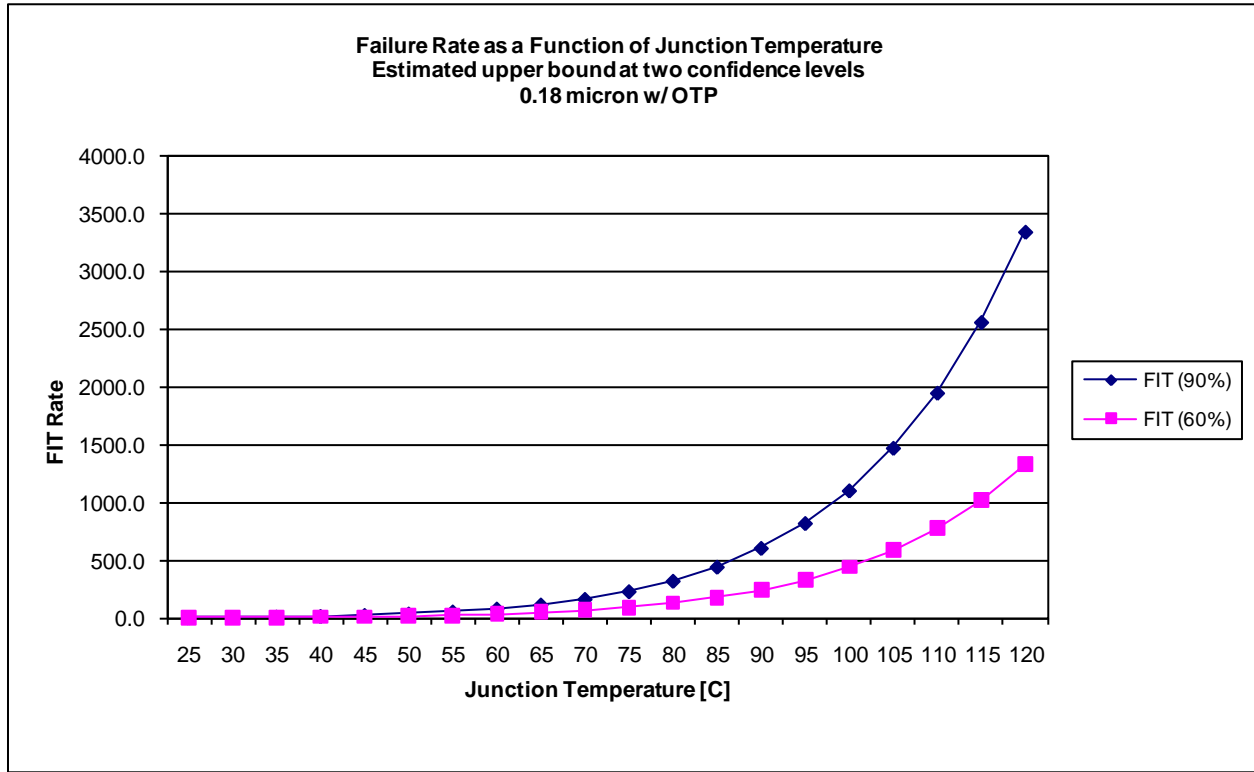


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FIT Estimation Curves for 0.18 um w/ embedded flash:					
<u>T_{ja}</u>	<u>A_f</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>MTTF</u>	
				<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1549.5	2.6	1.0	44017	110611
30	988.4	4.1	1.6	28079	70561
35	639.8	6.3	2.5	18175	45674
40	419.9	9.6	3.8	11929	29978
45	279.3	14.4	5.7	7934	19938
50	188.1	21.4	8.5	5344	13429
55	128.2	31.3	12.5	3643	9155
60	88.4	45.4	18.1	2512	6313
65	61.7	65.2	25.9	1751	4401
70	43.4	92.5	36.8	1234	3101
75	30.9	130.0	51.7	878	2207
80	22.2	180.9	72.0	631	1586
85	16.1	249.4	99.2	458	1150
90	11.8	340.9	135.6	335	842
95	8.7	461.9	183.8	247	621
100	6.5	620.9	247.1	184	462
105	4.9	828.1	329.5	138	346
110	3.7	1096.1	436.2	104	262
115	2.8	1440.5	573.2	79	199
120	2.1	1880.0	748.1	61	153



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.18 um w/ OTP:

Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	135	135	Junction Temperature at stress (assume 10C rise)
Ea	0.7	0.7	Energy Activation
D	322	322	Devices stressed
H	1000	1000	Number of hours on stress
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	188.1	188.1	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	322000.0	322000.0	Total device hours D*H
X2	4.6	1.8	Chi-Square Distribution Value
FIT	38.0	15.1	Failures in time [failures / 1xE9 hours] $= [X2 / (2*AF*D*H)] * 1E9$
MTTF	2.6E+07	6.6E+07	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	3003.1	7546.5	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

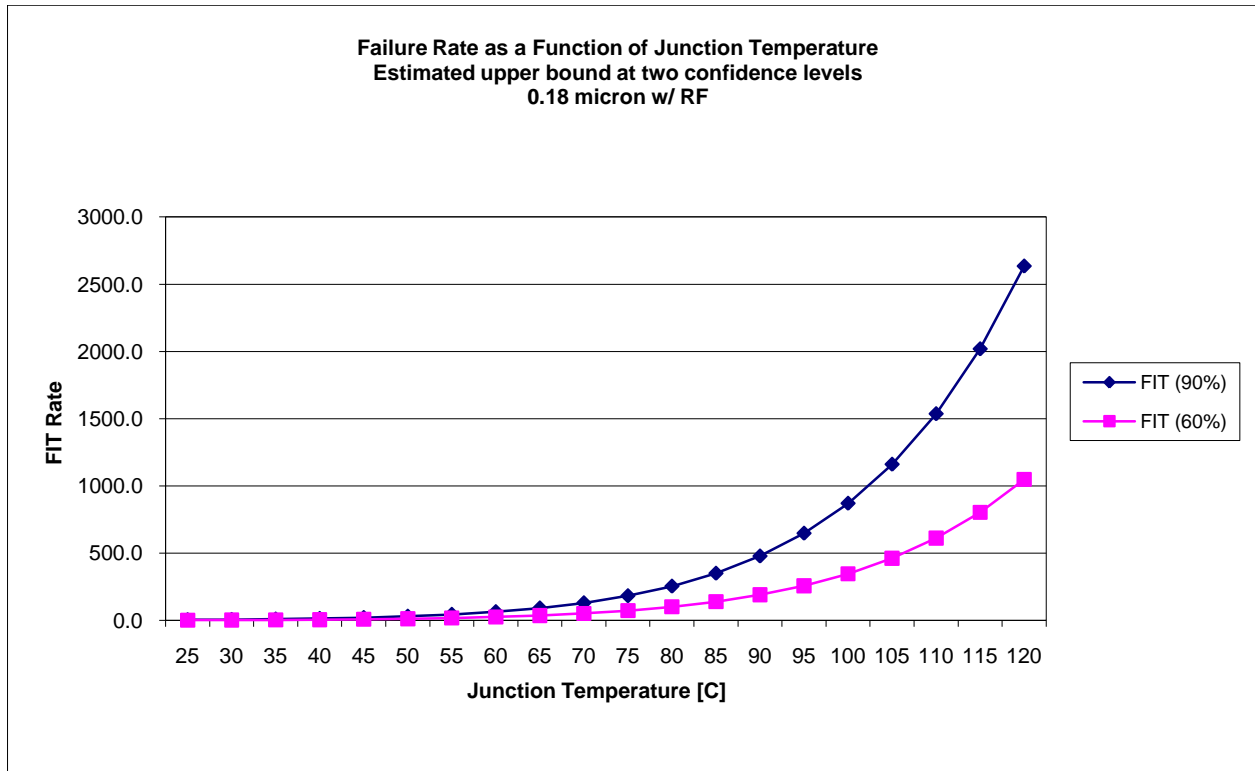


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FIT Estimation Curves for 0.18 um w/ OTP					
<u>Tj</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>MTTF</u> 90% (yrs)	<u>MTTF</u> 60% (yrs)
25	1549.5	4.6	1.8	24735	62159
30	988.4	7.2	2.9	15779	39652
35	639.8	11.2	4.4	10214	25667
40	419.9	17.0	6.8	6704	16846
45	279.3	25.6	10.2	4459	11204
50	188.1	38.0	15.1	3003	7547
55	128.2	55.8	22.2	2047	5144
60	88.4	80.9	32.2	1412	3548
65	61.7	116.0	46.2	984	2473
70	43.4	164.6	65.5	693	1743
75	30.9	231.3	92.0	494	1240
80	22.2	321.9	128.1	355	891
85	16.1	443.8	176.6	257	646
90	11.8	606.6	241.4	188	473
95	8.7	822.0	327.1	139	349
100	6.5	1104.9	439.7	103	260
105	4.9	1473.6	586.4	77	195
110	3.7	1950.6	776.2	59	147
115	2.8	2563.4	1020.1	45	112
120	2.1	3345.4	1331.3	34	86



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.18 um w/ RF:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	135	135	Junction Temperature at stress (assume 10C rise)
Ea	0.7	0.7	Energy Activation
D	409	409	Devices stressed
H	1000	1000	Number of hours on stress
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	188.1	188.1	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	409000.0	409000.0	Total device hours D*H
X2	4.6	1.8	Chi-Square Distribution Value
FIT	29.9	11.9	Failures in time [failures / 1xE9 hours] $= [X2 / (2*AF*D*H)] * 1E9$
MTTF	3.3E+07	8.4E+07	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	3814.5	9585.5	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

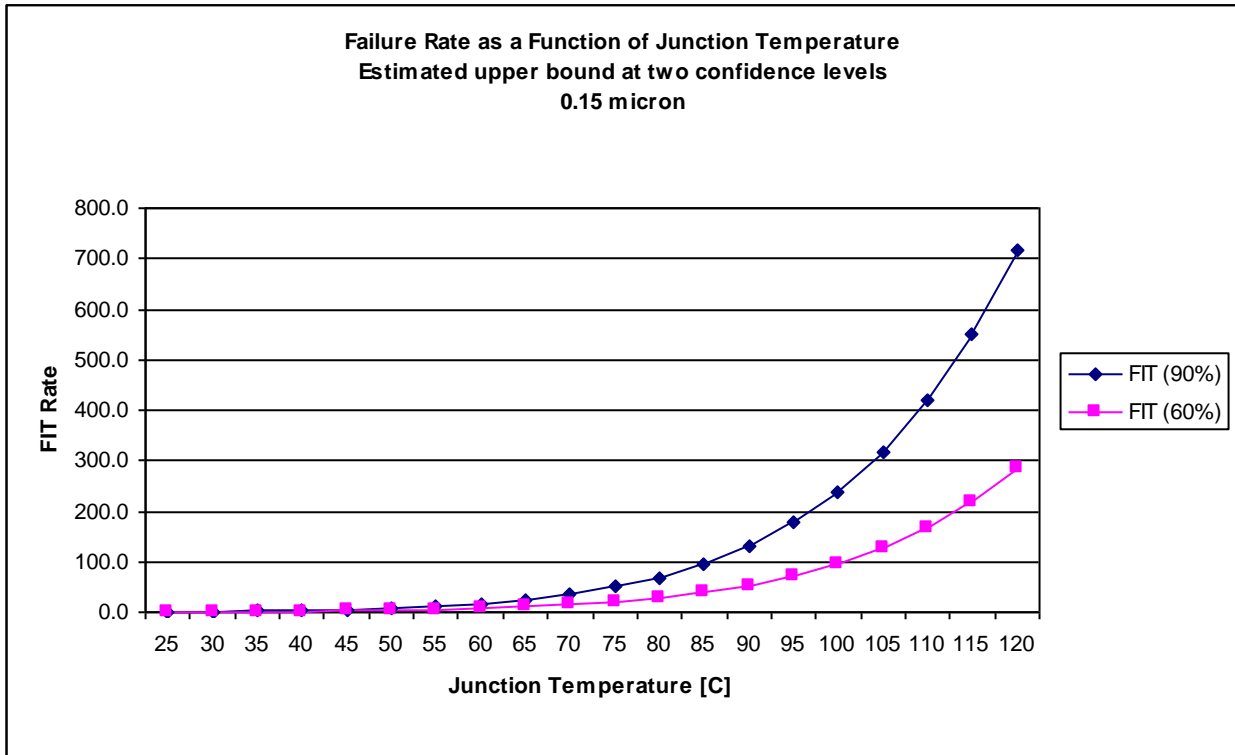


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FIT Estimation Curves for 0.18 um w/ RF:				<u>MTTF</u>	<u>MTTF</u>
<u>Tja</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1549.5	3.6	1.4	31419	78953
30	988.4	5.7	2.3	20043	50366
35	639.8	8.8	3.5	12973	32601
40	419.9	13.4	5.3	8515	21398
45	279.3	20.2	8.0	5663	14232
50	188.1	29.9	11.9	3814	9586
55	128.2	43.9	17.5	2600	6534
60	88.4	63.7	25.3	1793	4506
65	61.7	91.3	36.3	1250	3142
70	43.4	129.6	51.6	881	2214
75	30.9	182.1	72.5	627	1575
80	22.2	253.4	100.8	450	1132
85	16.1	349.4	139.0	327	821
90	11.8	477.5	190.0	239	601
95	8.7	647.1	257.5	176	443
100	6.5	869.9	346.2	131	330
105	4.9	1160.1	461.7	98	247
110	3.7	1535.7	611.1	74	187
115	2.8	2018.1	803.1	57	142
120	2.1	2633.8	1048.1	43	109



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.15 um:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	153	153	Junction Temperature at stress (assume 28C rise)
Ea	0.7	0.7	Energy Activation
D	647	647	Devices stressed
H	1000	1000	Number of hours on stress
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	436.2	436.2	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	647000.0	647000.0	Total device hours D*H
X2	4.6	1.8	Chi-Square Distribution Value
FIT	8.2	3.2	Failures in time [failures / 1xE9 hours] = $[X2/(2*AF*D*H)*1E9]$
MTTF	1.2E+08	3.1E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	13990.9	35158.3	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

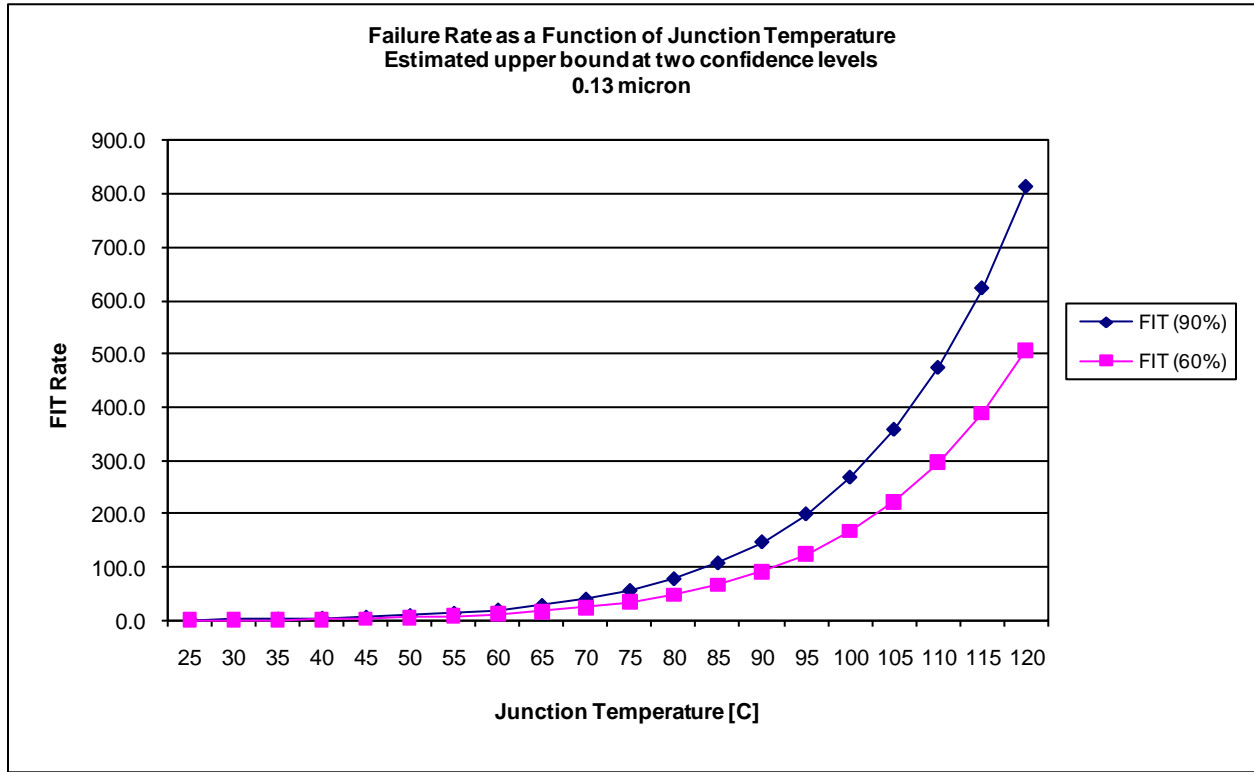


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FIT Estimation Curves for 0.15 um:				<u>MTTF</u>	<u>MTTF</u>
<u>T_{ja}</u>	<u>A_f</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	3592.6	1.0	0.4	115239	289588
30	2291.8	1.6	0.6	73513	184734
35	1483.5	2.4	1.0	47585	119577
40	973.7	3.7	1.5	31232	78484
45	647.6	5.5	2.2	20772	52199
50	436.2	8.2	3.2	13991	35158
55	297.3	12.0	4.8	9538	23967
60	205.0	17.4	6.9	6577	16528
65	143.0	24.9	9.9	4586	11523
70	100.7	35.3	14.1	3231	8119
75	71.7	49.6	19.8	2299	5778
80	51.5	69.1	27.5	1652	4152
85	37.4	95.3	37.9	1198	3011
90	27.3	130.2	51.8	877	2203
95	20.2	176.4	70.2	647	1626
100	15.0	237.2	94.4	481	1210
105	11.3	316.3	125.9	361	907
110	8.5	418.7	166.6	273	685
115	6.5	550.2	219.0	207	521
120	5.0	718.1	285.8	159	399



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.13 um:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	130	130	Junction Temperature at stress (assume 5C rise)
Ea	0.7	0.7	Energy Activation
D	4926	4926	Devices stressed
H	1000	1000	Number of hours on stress
F	3	3	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	147.0	147.0	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	8.0	8.0	degrees of freedom $[2(F+1)]$
DH	4926000	4926000	Total device hours D*H
X2	13.4	8.4	Chi-Square Distribution Value
FIT	9.2	5.8	Failures in time [failures / 1xE9 hours] $=[X2/(2*AF*D*H)*1E9]$
MTTF	1.1E+08	1.7E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	12369.5	19792.2	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

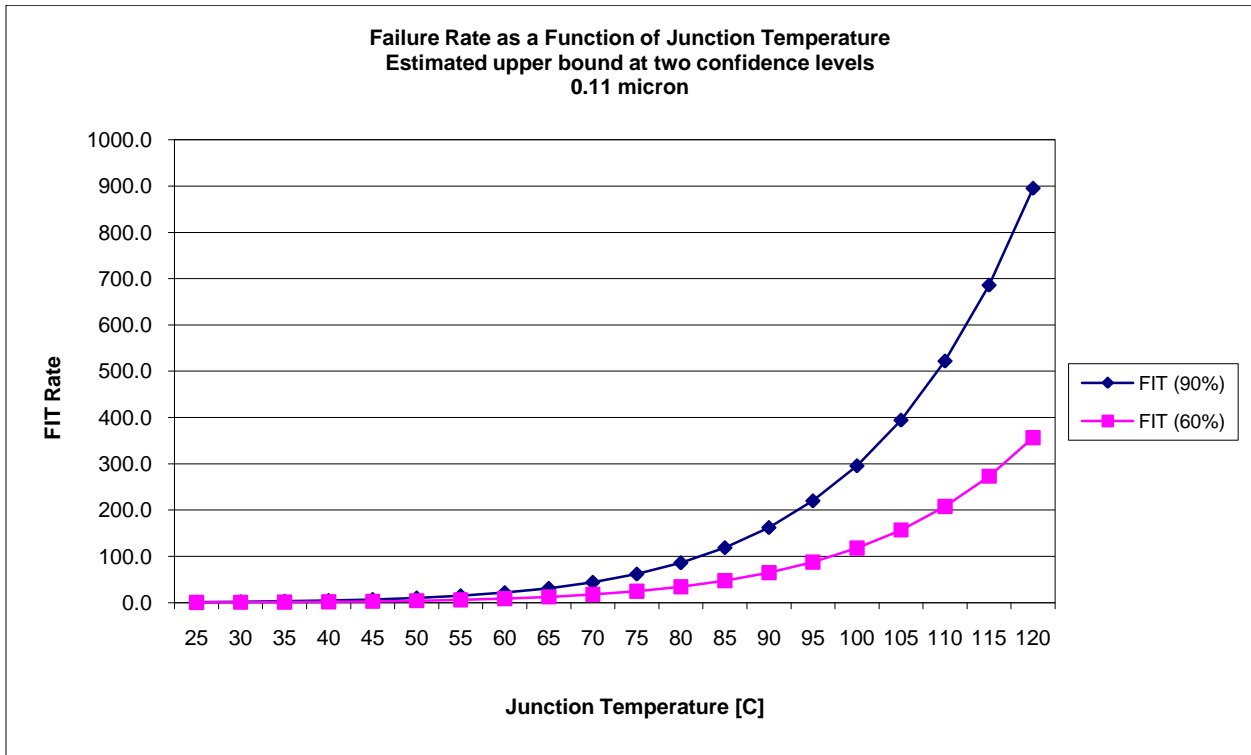


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FIT Estimation Curves for 0.13 um:				<u>MTTF</u>	<u>MTTF</u>
<u>T_{ja}</u>	<u>A_f</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1210.4	1.1	0.7	101884	163023
30	772.2	1.8	1.1	64994	103995
35	499.8	2.7	1.7	42070	67316
40	328.1	4.1	2.6	27613	44182
45	218.2	6.2	3.9	18365	29385
50	147.0	9.2	5.8	12369	19792
55	100.2	13.5	8.5	8432	13492
60	69.1	19.6	12.3	5815	9304
65	48.2	28.2	17.6	4054	6487
70	33.9	40.0	25.0	2856	4571
75	24.2	56.2	35.1	2033	3253
80	17.4	78.1	48.8	1461	2337
85	12.6	107.8	67.3	1059	1695
90	9.2	147.3	92.0	775	1240
95	6.8	199.6	124.7	572	915
100	5.1	268.2	167.6	426	681
105	3.8	357.8	223.6	319	511
110	2.9	473.6	296.0	241	386
115	2.2	622.3	388.9	183	293
120	1.7	812.2	507.6	141	225



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for 0.11 um:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	130	130	Junction Temperature at stress (assume 5C rise)
Ea	0.7	0.7	Energy Activation
D	1540	1540	Devices stressed
H	1000	1000	Number of hours on stress
F	0	0	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	147.0	147.0	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	2.0	2.0	degrees of freedom $[2(F+1)]$
DH	1540000	1540000	Total device hours D*H
X2	4.6	1.8	Chi-Square Distribution Value
FIT	10.2	4.0	Failures in time [failures / 1xE9 hours] = $[X2/(2*AF*D*H)*1E9]$
MTTF	9.8E+07	2.5E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	11219.9	28195.0	Mean Time To Failure [years] (Note: MTTF is 1/FIT)

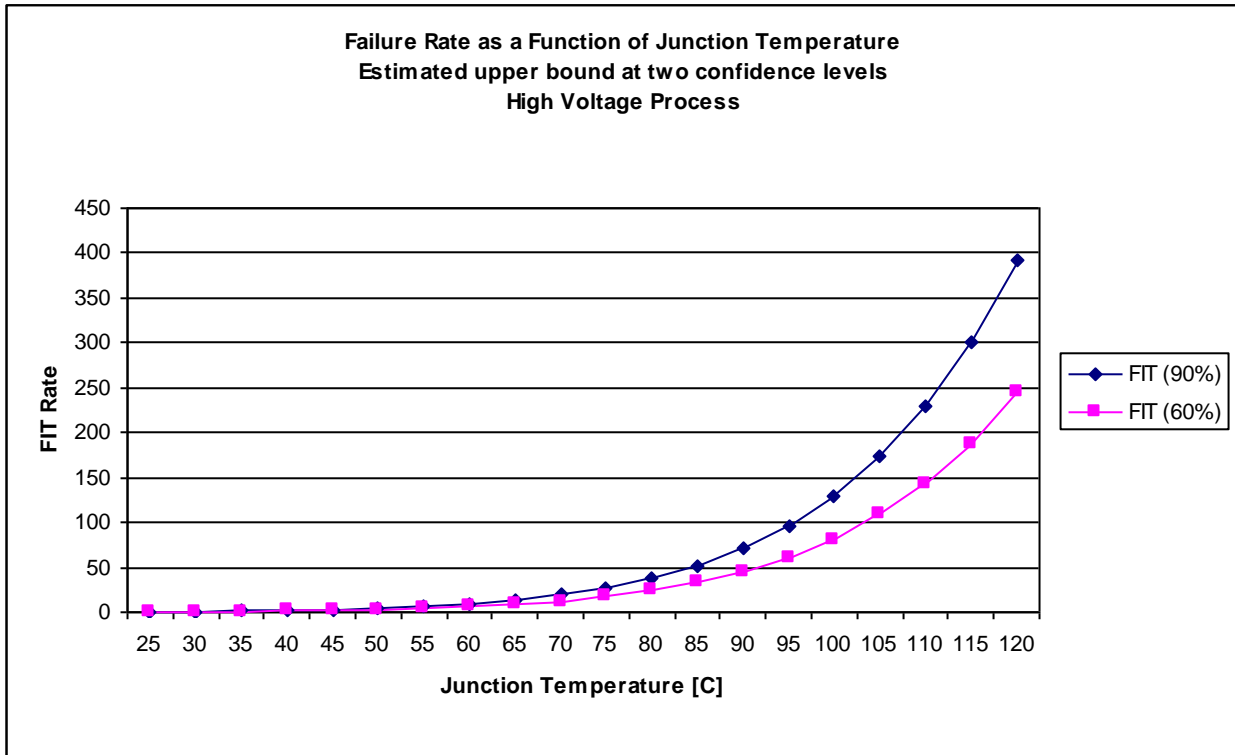


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FIT Estimation Curves for 0.11 um:				<u>MTTF</u>	<u>MTTF</u>
<u>Tja</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>90% (yrs)</u>	<u>60% (yrs)</u>
25	1210.4	1.2	0.5	92415	232234
30	772.2	1.9	0.8	58953	148146
35	499.8	3.0	1.2	38160	95894
40	328.1	4.6	1.8	25046	62940
45	218.2	6.9	2.7	16658	41861
50	147.0	10.2	4.0	11220	28195
55	100.2	14.9	5.9	7649	19221
60	69.1	21.6	8.6	5274	13254
65	48.2	31.0	12.4	3677	9241
70	33.9	44.1	17.5	2591	6511
75	24.2	61.9	24.6	1844	4634
80	17.4	86.2	34.3	1325	3330
85	12.6	118.8	47.3	961	2415
90	9.2	162.4	64.6	703	1767
95	6.8	220.0	87.6	519	1304
100	5.1	295.7	117.7	386	970
105	3.8	394.4	157.0	289	727
110	2.9	522.1	207.8	219	549
115	2.2	686.1	273.0	166	418
120	1.7	895.4	356.3	127	320



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Reliability FIT Calculations for temperature acceleration

SINGLE POINT CALCULATION for HV:			
Variables:	90%	60%	Confidence Level
Tja [C]	50	50	Junction Temperature at operating condition
Tsa [C]	125	125	Ambient Temperature at stress
Tjs [C]	155	155	Junction Temperature at stress (assume 30C rise)
Ea	0.7	0.7	Energy Activation
D	3141	3141	Devices stressed
H	1000	1000	Number of hours on stress
F	3	3	Number of failures
P	0.1	0.4	Confidence Level [.1 = 90%; .4 = 60%]
Constants:			
k	8.61E-05	8.61E-05	Boltzman's constant [eV/K]
Calculated Values:			
Af	476.8	476.8	Acceleration Factor: $[\exp(Ea/k*(1/(Tja + 273.15) - (1/(Tjs + 273.15)))]$
v	8.0	8.0	degrees of freedom $[2(F+1)]$
DH	3141000.0	3141000.0	Total device hours D*H
X2	13.4	8.4	Chi-Square Distribution Value
FIT	4.5	2.8	Failures in time [failures / 1xE9 hours] $= [X2 / (2*AF*D*H)] * 1E9$
MTTF	2.2E+08	3.6E+08	Mean Time To Failure [hours] (Note: MTTF is 1/FIT)
MTTF	25590.7	40947.4	Mean Time To Failure [years] (Note: MTTF is 1/FIT)



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FIT Estimation Curves for HV:

<u>Tja</u>	<u>Af</u>	<u>FIT (90%)</u>	<u>FIT (60%)</u>	<u>MTTF</u> <u>90% (yrs)</u>	<u>MTTF</u> <u>60% (yrs)</u>
25	3927.3	0.5	0.3	210783	337271
30	2505.3	0.8	0.5	134463	215152
35	1621.7	1.3	0.8	87037	139267
40	1064.4	2.0	1.2	57127	91407
45	707.9	3.0	1.9	37994	60794
50	476.8	4.5	2.8	25591	40947
55	325.0	6.5	4.1	17445	27914
60	224.1	9.5	5.9	12030	19249
65	156.3	13.6	8.5	8387	13421
70	110.1	19.3	12.1	5910	9456
75	78.4	27.1	17.0	4206	6730
80	56.3	37.8	23.6	3022	4836
85	40.8	52.1	32.5	2192	3507
90	29.9	71.2	44.5	1604	2566
95	22.0	96.5	60.3	1183	1894
100	16.4	129.7	81.0	880	1409
105	12.3	172.9	108.1	660	1056
110	9.3	228.9	143.1	499	798
115	7.1	300.8	188.0	379	607
120	5.4	392.6	245.4	291	465



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Part Numbers by Fab Technology

0.11 um		
BCXX	Si217X	Si4708-B
Si214X	Si4702-C19	Si4709-B
Si216X	Si4703-C19	
0.13 um		
Si210X	5XX	Si5324
Si211X	Si504X	Si5325
Si470X	Si530X	Si5326
Si471X	Si5315	Si533X
Si472X	Si5316	Si535X
Si473X	Si5317	Si5365
Si474X	Si5319	Si5366
Si4784	Si5322	Si5367
Si4785	Si5323	Si5368
Si483X		
0.15 um		
Si51XX		
0.18 um		
Si24XX	Si3226	Si3450
Si3050-E	Si3227	CP240X
Si3217X	Si324X	
0.18 um, embedded flash		
C8051F7XX	C8051F9XX	CF9XX
C8051F8XX		
0.18 um, OTP		
C8051T3XX	CT6XX	Si3453
C8051T6XX	CP2104	Si346X
CT3XX	Si3452	
0.18 um, RF		
Si100X	Si403X	Si443X
Si101X	Si433X	
0.25 um		
Si221X	Si3018	Si501X
Si3005	Si3019	Si502X
Si3006	Si305X	Si5310
Si3007	Si306X	Si5320
Si3008	Si307X	Si5321
Si3009	Si308X	Si5364
Si3010	Si31XX	Si82XX
Si3011	Si3291X	Si84XX
Si3017		

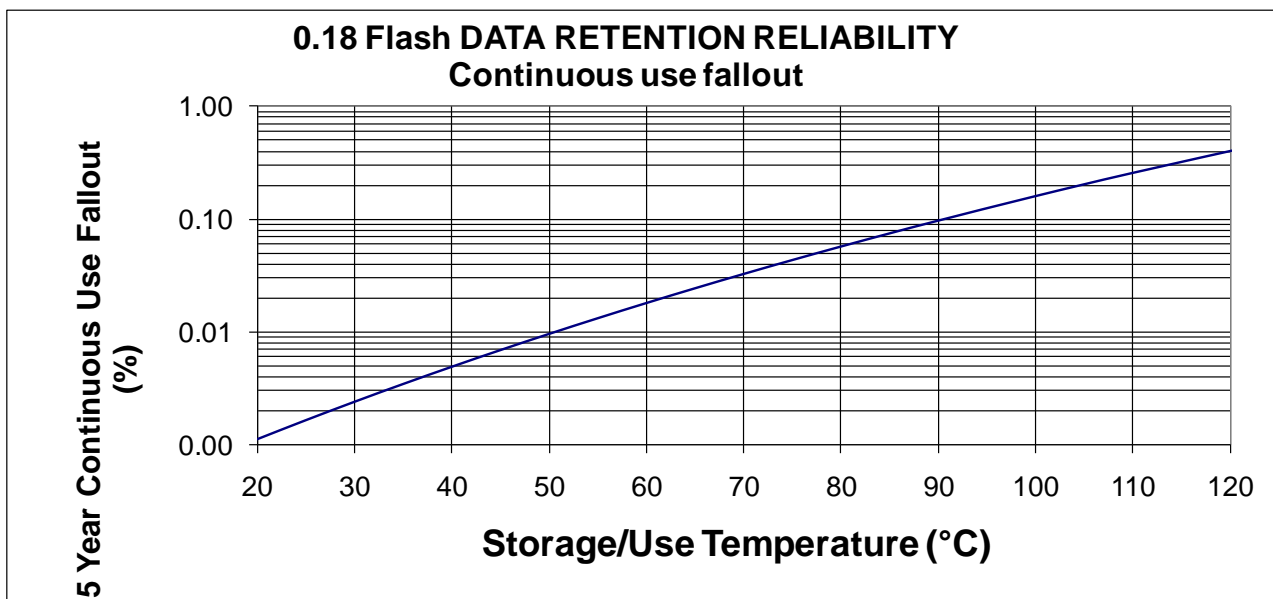
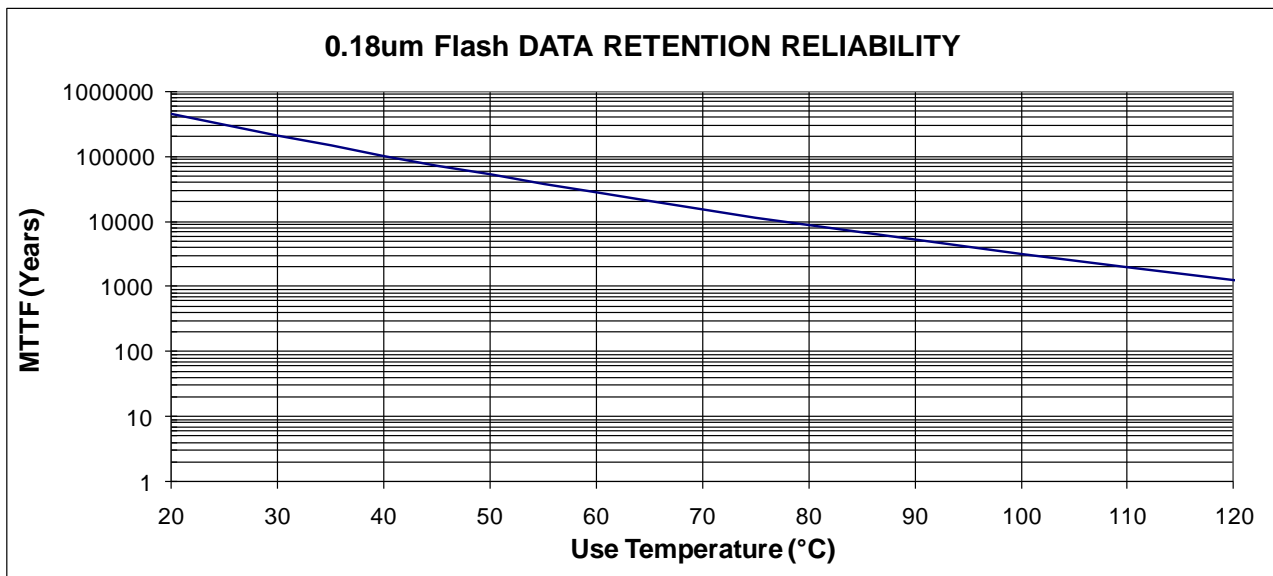
0.25 um, embedded flash		
C8051F4XX	CF4XX	Si825X
C8051F5XX	CF5XX	
0.315 um - 0.35 um		
Si220X	Si850X	IA35XX
Si41XX	Si851X	
0.35 um, embedded flash		
C8051F0XX	CF1XX	CP2103
C8051F1XX	CF2XX	CP2120
C8051F2XX	CF3XX	CP22XX
C8051F3XX	CP2101	Si4780
CF0XX	CP2102	Si8250
0.45 um - 0.5 um		
Si2400	Si3016	Si3225
Si3000	Si302X	Si3230
Si3012	Si321X	Si3232
Si3014	Si3220	Si3233
Si3015		
High Voltage		
Si2115	Si3239	Si3456
Si320X	Si340X	Si35XX
Si3217X	Si3455	Si823X
Si3238		
0.6 um - 0.8 um BiCMOS		
IA11XX	IAP24X	Si1102
IA12XX	IAP32X	Si1120
IA13XX	IAP4XX	Si402X
IA14XX	IAP5XX	Si432X
IA21XX	IAP8XX	Si442X
IA32XX	IAP91X	Si49XX
0.6 um - 1.0 um		
Si83XX	IAP6XX	IAP90X
Si854X	IAP7XX	IAP93X
IAP38X		
3 um BiPolar		
IAP29X	IAP31X	
Diode		
IA10XX		



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0.18um Flash Reliability Summary

Study	Bake Stress Temp (°C)	Bake Stress Hours	Qty	Charge-able Failures	TYPICAL CASE: Predicted Fit Rate @Ta=50°C, 60% UCL	10 Year Predicted Failure Rate @Ta=50°C, 60% UCL	WORST-CASE: Predicted Fit Rate @Ta=85°C, 60% UCL	10 Year Predicted Failure Rate @Ta=85°C, 60% UCL
TSMC	150	12000	231	0	2.3	0.02%	18.0	0.16%
TSMC-Current	150	1000	90	0	71.3	0.62%	554.8	4.74%
GSMC	150	1000	85	0	75.5	0.66%	587.5	5.02%
CUM			406	0	2.2	0.02%	17	0.15%

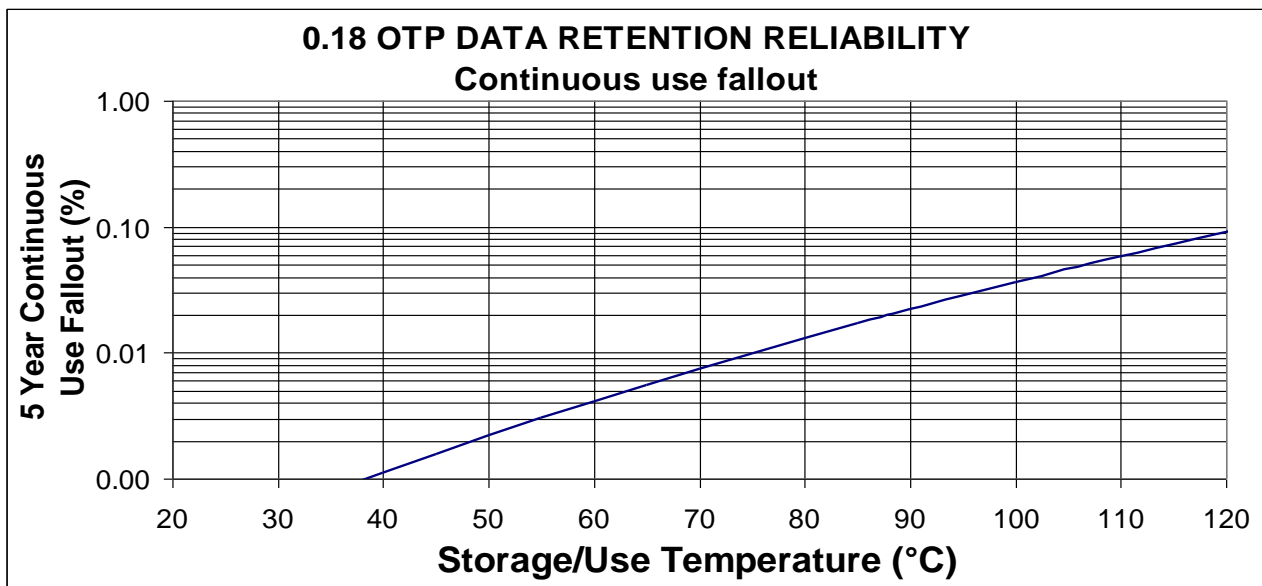
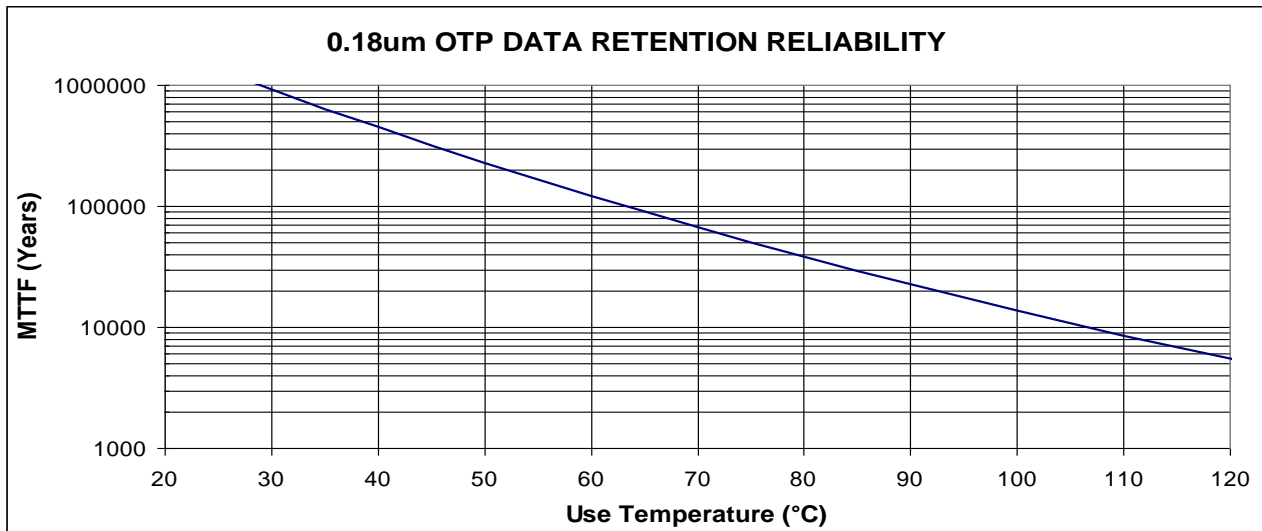




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0.18um OTP Reliability Summary

Study	Bake Stress Temp (°C)	Bake Stress Hours	Qty	Chargeable Failures	TYPICAL CASE: Predicted Fit Rate @Ta=50°C, 60% UCL	10 Year Predicted Failure Rate @Ta=50°C, 60% UCL	WORST-CASE: Predicted Fit Rate @Ta=85°C, 60% UCL	10 Year Predicted Failure Rate @Ta=85°C, 60% UCL
Fab	200	4032	462	0	0.6	0.01%	4.9	0.04%
Fab	150	1000	298	0	21.5	0.19%	167.6	1.46%
T600	150	1000	2015	0	3.2	0.03%	24.8	0.22%
T606/10/30	150	1000	400	0	16.0	0.14%	124.8	1.09%
CUM			3175	0	0.5	0.00%	4	0.03%

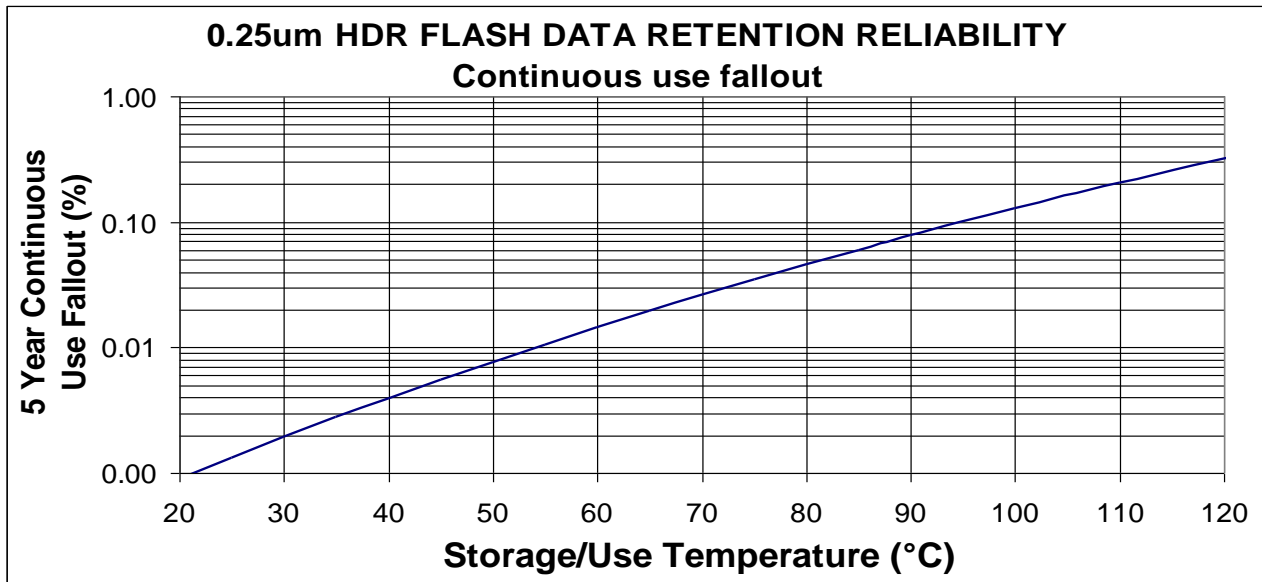
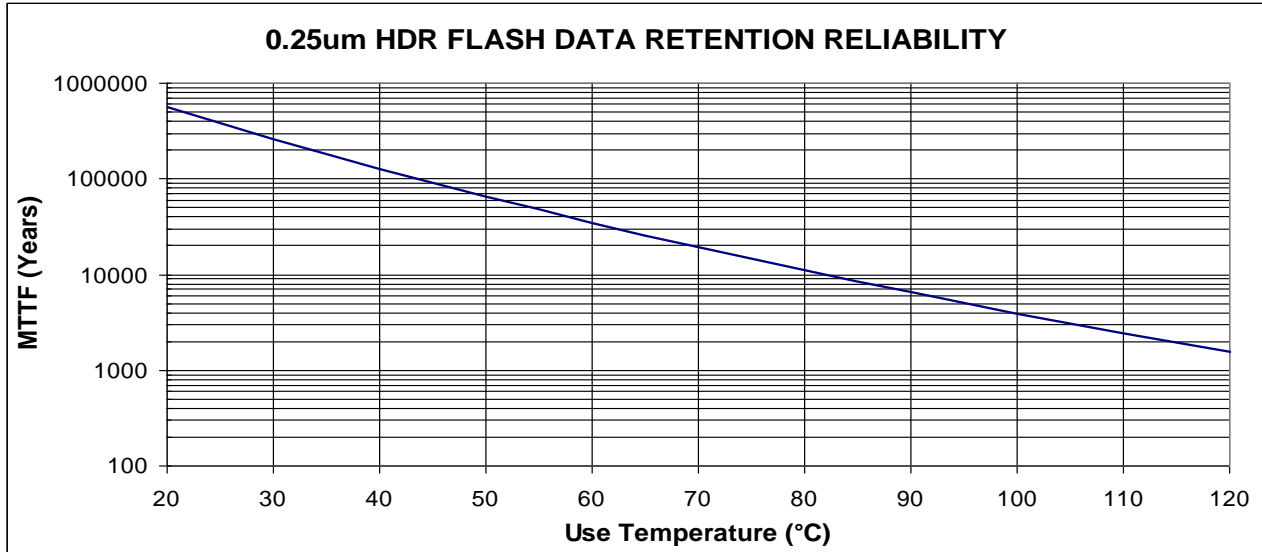




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0.25um Automotive Flash Reliability Summary

Study	Bake Stress Temp (°C)	Bake Stress Hours	Qty	Charge-able Failures	TYPICAL CASE: Predicted Fit Rate @Ta=50°C, 60% UCL	10 Year Predicted Failure Rate @Ta=50°C, 60% UCL	WORST-CASE: Predicted Fit Rate @Ta=85°C, 60% UCL	10 Year Predicted Failure Rate @Ta=85°C, 60% UCL
F250/410	150	2008	160	0	20.0	0.17%	155.4	1.35%
Si8250	150	5002	66	0	19.4	0.17%	151.3	1.32%
Auto MCU	150	1000	1844	0	3.5	0.03%	27.1	0.24%
Fab	150	5000	231	0	5.6	0.05%	43.2	0.38%
CUM			2301	0	1.8	0.02%	14	0.12%

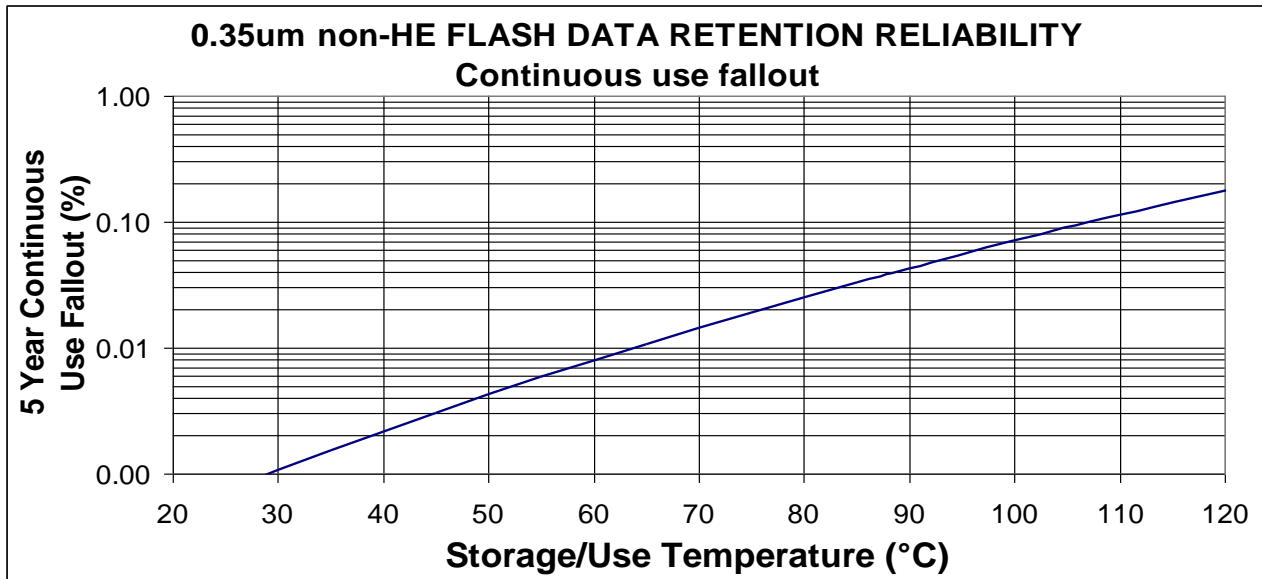
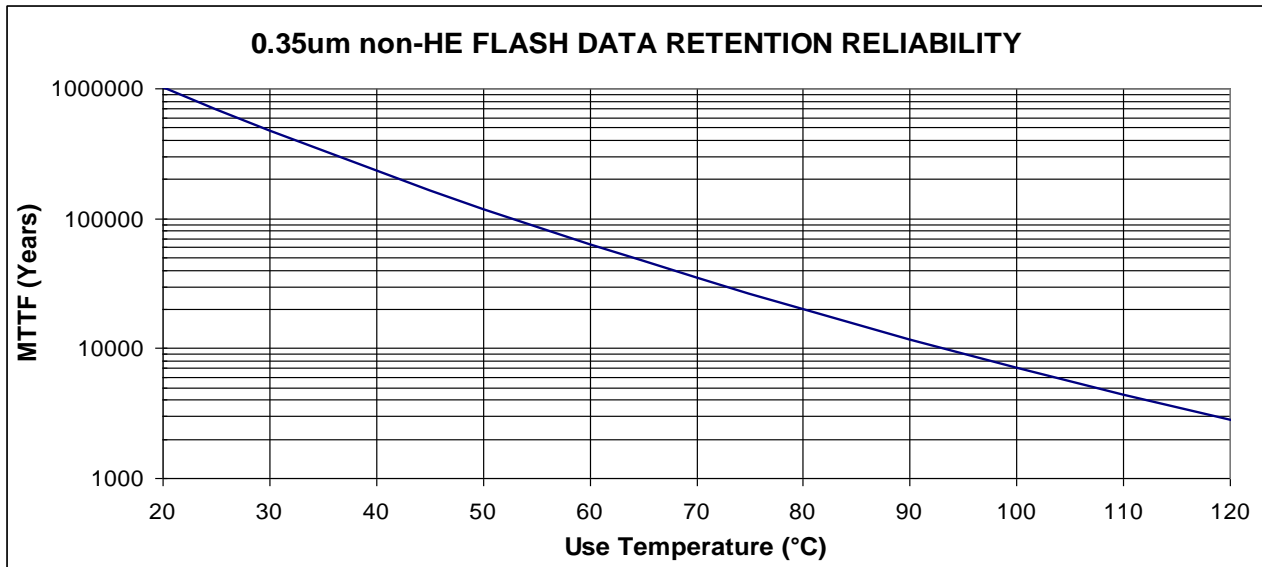




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0.35um Flash Reliability Summary

Study	Bake Stress Temp (°C)	Bake Stress Hours	Qty	Charge-able Failures	TYPICAL CASE: Predicted Fit Rate @Ta=50°C, 60% UCL	10 Year Predicted Failure Rate @Ta=50°C, 60% UCL	WORST-CASE: Predicted Fit Rate @Ta=85°C, 60% UCL	10 Year Predicted Failure Rate @Ta=85°C, 60% UCL
Fab	250	576	216	0	2.4	0.02%	18.7	0.16%
Fab	150	1000	230	0	27.9	0.24%	217.1	1.88%
SST	150	2000	462	0	6.9	0.06%	54.0	0.47%
SiLabs	150	1000	2829	0	2.4	0.02%	17.6	0.15%
CUM			3737	0	1.0	0.01%	8	0.07%

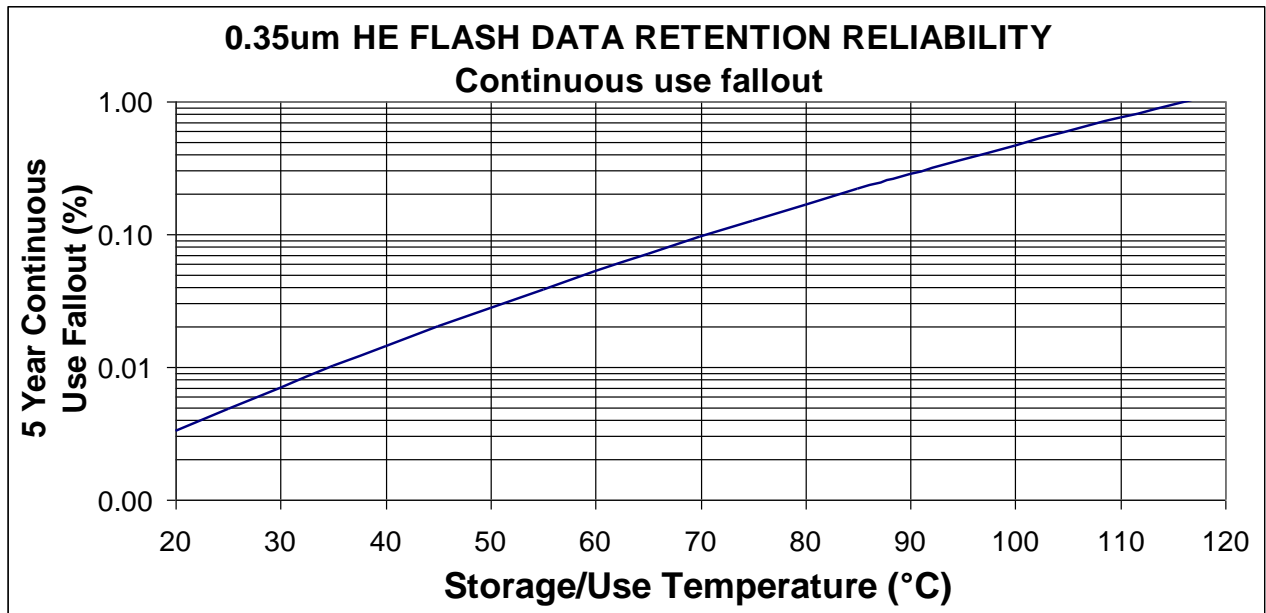
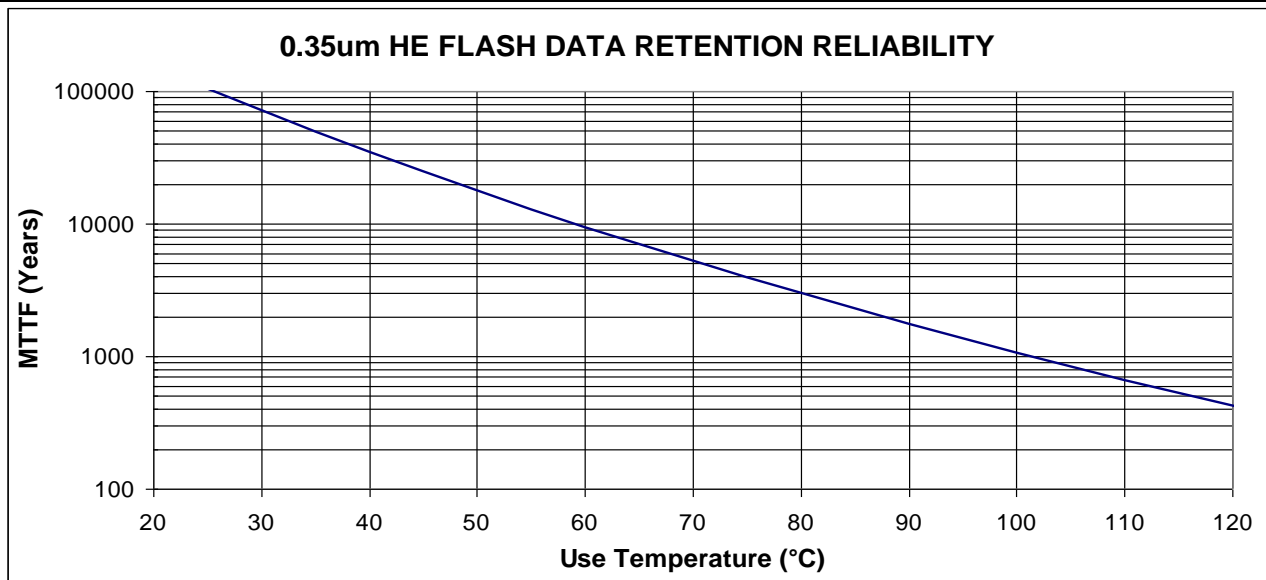




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0.35um High Endurance Flash Reliability Summary

Study	Bake Stress Temp (°C)	Bake Stress Hours	Qty	Charge-able Failures	TYPICAL CASE: Predicted Fit Rate @Ta=50°C, 60% UCL	10 Year Predicted Failure Rate @Ta=50°C, 60% UCL	WORST-CASE: Predicted Fit Rate @Ta=85°C, 60% UCL	10 Year Predicted Failure Rate @Ta=85°C, 60% UCL
Fab	150	1000	231	0	27.8	0.24%	216.2	1.88%
F360	150	1000	269	0	23.9	0.21%	185.6	1.61%
F336	150	1000	500	0	12.8	0.11%	99.9	0.87%
CUM			1000	0	6.4	0.06%	50	0.44%





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Reliability Monitor Program

Overview

Once a product is qualified, we verify continued product reliability with a reliability monitor program. The monitor program is scheduled to periodically sample device families, wafer fab technologies and package technologies. The results are published in this report. Any failures are used to drive corrective action and process and product improvement.

Stress Descriptions

Silicon Laboratories follows JEDEC as the preferred industry standard. The most common reliability tests and conditions are listed in the following table. The specific JEDEC documents are available on the Internet at www.jedec.org.

Reliability Tests, Procedures and Conditions Table

Symbol	Stress Name	Stress Procedure	Standard Conditions
DR	Data Retention Bake	AEC_Q100	150 °C (pkg form); 250C (wafer)
ELFR	Early Life Failure Rate	JEDEC JESD22-A108	125 °C; Max operating voltage
HAST	Highly-Accelerated Temperature and Humidity Stress Test	JEDEC JESD22-A110	130 °C; 85%rh; 22.2 psia; biased
HTB	High Temperature Bake	JEDEC JESD22-A103	150 °C
LTOL	Low Temperature Operating Life	JEDEC JESD22-A108	-10 °C; Max operating voltage
HTOL	High Temperature Operating Life	JEDEC JESD22-A108	125 °C; Max operating voltage
PC	Preconditioning	JEDEC JESD22-A113	According to MSL level prior to package stresses (listed below)
AU	Autoclave	JEDEC JESD22-A102	121 °C; 100%rh; 205kPa
TC	Temperature Cycle	JEDEC JESD22-A104	Condition C: -65 to 150 °C
U-HAST	Unbiased HAST	JEDEC JESD22-A118	130 °C; 85%rh
THB	Temperature Humidity Bias	JEDEC JESD22-A101	85 °C; 85%RH; Max operating voltage
Qualification Guideline	Stress Test Driven Qualification of Integrated Circuits; EIA / JEDEC EIA/JESD47		



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Silicon Reliability Test Method and Conditions

Early Life Failure Rate (ELFR)

The purpose of this test is to simulate the user operation over the first portion of the product lifetime, also called early life. Silicon Laboratories typically uses dynamic conditions, meaning the device is powered up, and the inputs are toggled to exercise a maximum number of transistors and circuit area. Reliability acceleration is accomplished primarily by temperature and secondarily by voltage.

High Temperature Operating Life (HTOL)

The purpose of this test is to simulate the user part operation over the expected life of the product. We typically use dynamic conditions, meaning the device is powered up, and the inputs are toggled to exercise a maximum number of transistors and circuit area. Reliability acceleration is accomplished primarily by temperature and secondarily by voltage.

High Temperature Storage Life (HTSL) / High Temperature Bake (HTB)

The purpose of this test is to determine the effect of storage at elevated temperature. This is performed to assess the stability of semiconductor device materials and interfaces.

Low Temperature Operating Life (LTOL)

The purpose of this test is to simulate the user operation at low temperature. This is a specialized test to address specific fab failure mechanisms, such as hot-carrier injection. Wafer level reliability tests are more effective for this characterization and are the primary qualification method. Silicon Laboratories typically uses dynamic conditions, meaning the device is powered up, and the inputs are toggled to exercise a maximum number of transistors and circuit area.

Nonvolatile Memory Data Retention (DR)

The purpose of this test is to measure the ability of a nonvolatile memory cell to retain its charge state at elevated temperature in the absence of applied external bias. This test can be done either in wafer form or on packaged units.



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Reliability Monitor Report – Silicon Stresses

QLotNu	Stress	FabProcess	ReadDate	SampleSize	ReadPt	Fails	°C
27198	ELFR	0.11 um	14-May-09	824	48	0	125
27321	ELFR	0.11 um	6-Jun-09	499	48	0	125
27267	HTOL	0.11 um	7-Jun-09	80	500	0	125
27187	HTOL	0.11 um	14-Jul-09	78	1000	0	125
27432	ELFR	0.11 um	15-Jul-09	993	24	0	125
27494	ELFR	0.11 um	27-Jul-09	512	48	0	125
27268	LTOL	0.11 um	2-Aug-09	69	1000	0	-10
27611	ELFR	0.11 um	2-Sep-09	542	48	0	125
27687	ELFR	0.11 um	10-Sep-09	388	48	0	125
27544	BAKE	0.11 um	11-Sep-09	25	1000	0	150
27697	ELFR	0.11 um	22-Sep-09	532	48	0	125
27571	HTOL	0.11 um	26-Sep-09	80	1000	0	95
27596	LTOL	0.11 um	1-Oct-09	40	1000	0	-10
27672	HTOL	0.11 um	12-Oct-09	84	1000	0	125
27848	ELFR	0.11 um	14-Oct-09	516	48	0	75
27886	ELFR	0.11 um	29-Oct-09	514	48	0	75
27772	LTOL	0.11 um	17-Nov-09	83	1000	0	-10
27773	HTOL	0.11 um	17-Nov-09	83	1000	0	125
27938	ELFR	0.11 um	20-Nov-09	505	48	0	75
27984	ELFR	0.11 um	7-Dec-09	180	48	0	90
27914	HTOL	0.11 um	16-Dec-09	240	1000	0	75
28029	ELFR	0.11 um	24-Dec-09	620	48	0	90
27909	HTOL	0.11 um	5-Jan-10	300	1000	0	125
28021	HTOL	0.11 um	7-Jan-10	239	1000	0	75
28200	ELFR	0.11 um	2-Feb-10	598	48	0	125
28227	ELFR	0.11 um	3-Feb-10	519	48	0	125
28158	BAKE	0.11 um	13-Mar-10	78	1000	0	150
28364	ELFR	0.11 um	21-Mar-10	800	48	0	90
28197	BAKE	0.11 um	24-Mar-10	25	1000	0	150
28526	ELFR	0.11 um	31-Mar-10	505	48	0	125
26523	HTOL	0.13 um	3-Apr-09	125	2000	0	125
27021	HTOL	0.13 um	10-Apr-09	80	1000	0	110
27039	BAKE	0.13 um	10-Apr-09	42	1000	0	150
27119	ELFR	0.13 um	15-Apr-09	807	48	0	125
27253	BAKE	0.13 um	12-Jun-09	80	1000	0	150
27174	BAKE	0.13 um	19-Jun-09	78	1000	0	150
27179	BAKE	0.13 um	19-Jun-09	78	1000	0	150
27182	BAKE	0.13 um	19-Jun-09	78	1000	0	150
27552	ELFR	0.13 um	6-Aug-09	127	48	0	125
27246	HTOL	0.13 um	8-Aug-09	79	1000	0	125
27600	ELFR	0.13 um	25-Aug-09	510	48	0	125
27247	BAKE	0.13 um	31-Aug-09	46	1000	0	150
27248	BAKE	0.13 um	31-Aug-09	46	1000	0	150
27569	ELFR	0.13 um	11-Sep-09	510	48	0	125
27249	BAKE	0.13 um	11-Sep-09	46	1000	0	150
27707	ELFR	0.13 um	21-Sep-09	340	48	0	125
27599	BAKE	0.13 um	26-Sep-09	90	1000	0	150
27598	BAKE	0.13 um	28-Sep-09	90	1000	0	150
27120	HTOL	0.13 um	27-Oct-09	80	1000	0	125



Silicon Laboratories

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QLotNum	Stress	FabProcess	ReadDate	SampleSize	ReadPt	Fails	°C
27121	HTOL	0.13 um	27-Oct-09	78	1000	0	125
27740	BAKE	0.13 um	30-Oct-09	25	1000	0	150
27706	HTOL	0.13 um	31-Oct-09	80	1000	0	125
27685	HTOL	0.13 um	1-Nov-09	79	1000	0	125
27945	ELFR	0.13 um	20-Nov-09	510	48	0	125
27973	ELFR	0.13 um	8-Dec-09	510	48	0	110
28033	ELFR	0.13 um	16-Dec-09	510	48	0	110
27923	BAKE	0.13 um	17-Dec-09	27	1000	0	150
27917	HTOL	0.13 um	23-Dec-09	80	1000	0	125
28075	ELFR	0.13 um	6-Jan-10	510	48	0	125
28302	ELFR	0.13 um	12-Feb-10	507	48	0	125
28085	BAKE	0.13 um	15-Feb-10	87	1000	0	150
28303	ELFR	0.13 um	16-Feb-10	510	48	0	125
28509	ELFR	0.13 um	22-Mar-10	123	48	0	125
28527	ELFR	0.13 um	28-Mar-10	392	48	0	125
27077	HTOL	0.18 um	22-Apr-09	80	1000	0	125
27078	HTOL	0.18 um	22-Apr-09	80	1000	0	125
27230	ELFR	0.18 um	11-May-09	84	48	0	25
27149	BAKE	0.18 um	12-May-09	30	1000	0	150
27311	ELFR	0.18 um	21-May-09	499	48	0	25
27314	ELFR	0.18 um	24-May-09	740	48	0	125
27213	BAKE	0.18 um	1-Jun-09	30	1000	0	150
27312	ELFR	0.18 um	3-Jun-09	740	48	0	125
27313	ELFR	0.18 um	8-Jun-09	740	48	0	125
27492	HTOL	0.18 um	11-Sep-09	80	1000	0	125
27493	HTOL	0.18 um	11-Sep-09	79	1000	0	125
27850	ELFR	0.18 um	19-Oct-09	540	48	0	125
27708	BAKE	0.18 um	26-Oct-09	27	1000	0	150
27876	BAKE	0.18 um	2-Dec-09	26	1000	0	150
27889	HTOL	0.18 um	9-Dec-09	80	1000	0	125
28199	ELFR	0.18 um	5-Feb-10	540	48	0	125
28467	ELFR	0.18 um	23-Mar-10	502	48	0	125
28296	HTOL	0.18 um	26-Mar-10	100	1000	0	125
27065	HTOL	0.18 um, embedded flash	24-Apr-09	88	1000	0	125
27396	ELFR	0.18 um, embedded flash	25-Jun-09	509	48	0	125
27422	HTOL	0.18 um, embedded flash	11-Aug-09	80	1000	0	125
27592	ELFR	0.18 um, embedded flash	19-Aug-09	520	48	0	125
27470	BAKE	0.18 um, embedded flash	24-Aug-09	26	1000	0	150
27619	ELFR	0.18 um, embedded flash	26-Aug-09	520	48	0	125
27547	BAKE	0.18 um, embedded flash	15-Sep-09	26	1000	0	150
27580	BAKE	0.18 um, embedded flash	28-Sep-09	26	1000	0	125
27928	ELFR	0.18 um, embedded flash	11-Nov-09	520	48	0	125
27958	HTOL	0.18 um, embedded flash	4-Jan-10	84	1000	0	125
28218	ELFR	0.18 um, embedded flash	4-Feb-10	516	48	0	125
28092	BAKE	0.18 um, embedded flash	22-Feb-10	31	1000	0	150
28093	BAKE	0.18 um, embedded flash	22-Feb-10	28	1000	0	150
28301	HTOL	0.18 um, embedded flash	24-Mar-10	80	1000	0	125
27148	ELFR	0.18 um, OTP	2-Apr-09	129	48	0	125
27143	ELFR	0.18 um, OTP	7-Apr-09	502	48	0	125
27154	ELFR	0.18 um, OTP	10-Apr-09	504	48	0	125
27162	ELFR	0.18 um, OTP	15-Apr-09	519	48	0	125
27163	ELFR	0.18 um, OTP	15-Apr-09	500	48	0	125



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QLotNum	Stress	FabProcess	ReadDate	SampleSize	ReadPt	Fails	°C
27147	HTOL	0.18 um, OTP	19-May-09	80	1000	0	125
27166	HTOL	0.18 um, OTP	1-Jun-09	80	1000	0	125
27235	BAKE	0.18 um, OTP	4-Jun-09	28	1000	0	150
27240	BAKE	0.18 um, OTP	4-Jun-09	28	1000	0	150
27242	HTOL	0.18 um, OTP	12-Jun-09	81	1000	0	125
27490	ELFR	0.18 um, OTP	12-Aug-09	520	48	0	125
27370	ELFR	0.18 um, OTP	18-Aug-09	520	48	0	125
27686	HTOL	0.18 um, OTP	20-Oct-09	82	1000	0	125
27698	BAKE	0.18 um, OTP	21-Oct-09	26	1000	0	150
27897	ELFR	0.18 um, OTP	2-Nov-09	520	48	0	125
27487	ELFR	0.18 um, RF	22-Jul-09	480	48	0	125
27631	HTOL	0.18 um, RF	27-Jul-09	120	1000	0	125
27632	HTOL	0.18 um, RF	27-Jul-09	119	1000	0	125
27538	ELFR	0.18 um, RF	11-Aug-09	480	48	0	125
28120	ELFR	0.18 um, RF	2-Feb-10	808	48	0	125
28163	HTOL	0.18 um, RF	19-Mar-10	85	1000	0	125
28165	HTOL	0.18 um, RF	19-Mar-10	85	1000	0	125
28172	BAKE	0.18 um, RF	22-Mar-10	45	1000	0	150
28523	ELFR	0.18 um, RF	25-Mar-10	818	48	0	125
27058	HTOL	0.25 um	23-Apr-09	80	1000	0	125
27192	ELFR	0.25 um	29-Apr-09	504	48	0	125
27195	ELFR	0.25 um	29-Apr-09	506	48	0	125
27144	HTOL	0.25 um	14-May-09	80	1000	0	125
27145	LTOL	0.25 um	2-Jun-09	80	1000	0	-10
27228	BAKE	0.25 um	6-Jun-09	30	1000	0	150
27281	BAKE	0.25 um	22-Jun-09	30	1000	0	150
27282	BAKE	0.25 um	22-Jun-09	27	1000	0	150
27286	BAKE	0.25 um	22-Jun-09	30	1000	0	150
27446	ELFR	0.25 um	16-Jul-09	506	48	0	125
27477	ELFR	0.25 um	23-Jul-09	504	48	0	125
27572	ELFR	0.25 um	11-Aug-09	510	48	0	125
27562	ELFR	0.25 um	18-Aug-09	500	24	0	125
27625	ELFR	0.25 um	27-Aug-09	505	48	0	125
27679	HTOL	0.25 um	23-Oct-09	79	1000	0	125
27675	HTOL	0.25 um	29-Oct-09	79	1000	0	125
27742	BAKE	0.25 um	8-Nov-09	30	1000	0	150
27747	BAKE	0.25 um	8-Nov-09	31	1000	0	150
28098	ELFR	0.25 um	20-Jan-10	812	192	0	125
28260	BAKE	0.25 um	15-Feb-10	80	500	0	175
28208	ELFR	0.25 um	17-Feb-10	800	48	0	125
28465	ELFR	0.25 um	19-Feb-10	502	48	0	125
28094	BAKE	0.25 um	22-Feb-10	30	1000	0	150
28101	BAKE	0.25 um	22-Feb-10	30	1000	0	150
28230	BAKE	0.25 um	23-Feb-10	30	500	0	175
28259	BAKE	0.25 um	23-Feb-10	30	500	0	175
28338	ELFR	0.25 um	23-Feb-10	502	48	0	125
28244	BAKE	0.25 um	25-Feb-10	30	500	0	175
28251	BAKE	0.25 um	25-Feb-10	30	500	0	175
28252	BAKE	0.25 um	25-Feb-10	30	500	0	175
28276	BAKE	0.25 um	27-Feb-10	30	500	0	150
28277	BAKE	0.25 um	27-Feb-10	29	500	0	150
28330	ELFR	0.25 um	3-Mar-10	800	48	0	125



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QLotNum	Stress	FabProcess	ReadDate	SampleSize	ReadPt	Fails	°C
28342	BAKE	0.25 um	7-Mar-10	80	500	0	175
28346	BAKE	0.25 um	7-Mar-10	80	500	0	175
28368	BAKE	0.25 um	12-Mar-10	30	500	0	175
28274	BAKE	0.25 um	17-Mar-10	30	1000	0	150
28275	BAKE	0.25 um	17-Mar-10	30	1000	0	150
28232	BAKE	0.25 um	19-Mar-10	30	1000	0	150
28239	BAKE	0.25 um	19-Mar-10	30	1000	0	150
28235	BAKE	0.25 um	20-Mar-10	30	1000	0	150
28249	BAKE	0.25 um	20-Mar-10	30	1000	0	150
28250	BAKE	0.25 um	20-Mar-10	30	1000	0	150
28257	BAKE	0.25 um	20-Mar-10	30	1000	0	150
28258	BAKE	0.25 um	20-Mar-10	30	1000	0	150
28311	BAKE	0.25 um	22-Mar-10	30	1000	0	150
28314	BAKE	0.25 um	22-Mar-10	29	1000	0	150
28384	BAKE	0.25 um	22-Mar-10	30	1000	0	150
28388	BAKE	0.25 um	22-Mar-10	30	1000	0	175
28505	ELFR	0.25 um	22-Mar-10	809	48	0	125
27014	HTOL	0.25 um, embedded flash	10-Apr-09	99	1000	0	125
27122	HTOL	0.315 um - 0.35 um	12-May-09	80	1000	0	125
27123	HTOL	0.315 um - 0.35 um	12-May-09	80	1000	0	125
27124	HTOL	0.315 um - 0.35 um	12-May-09	79	1000	0	125
27280	BAKE	0.35 um, embedded flash	18-Jun-09	28	1000	0	150
27202	BAKE	0.6 um - 0.8 um BiCMOS	5-Jun-09	25	1000	0	150
27203	BAKE	0.6 um - 0.8 um BiCMOS	5-Jun-09	25	1000	0	150
27204	BAKE	0.6 um - 0.8 um BiCMOS	5-Jun-09	25	1000	0	150
27387	BAKE	0.6 um - 0.8 um BiCMOS	29-Jul-09	25	1000	0	150
27391	BAKE	0.6 um - 0.8 um BiCMOS	29-Jul-09	25	1000	0	150
27393	BAKE	0.6 um - 0.8 um BiCMOS	29-Jul-09	25	1000	0	150
27372	BAKE	0.6 um - 0.8 um BiCMOS	3-Aug-09	25	1000	0	150
27376	BAKE	0.6 um - 0.8 um BiCMOS	3-Aug-09	25	1000	0	150
27381	BAKE	0.6 um - 0.8 um BiCMOS	3-Aug-09	25	1000	0	150
27680	ELFR	0.6 um - 0.8 um BiCMOS	20-Aug-09	480	48	0	125
27528	BAKE	0.6 um - 0.8 um BiCMOS	2-Oct-09	25	1000	0	150
27532	BAKE	0.6 um - 0.8 um BiCMOS	2-Oct-09	25	1000	0	150
27536	BAKE	0.6 um - 0.8 um BiCMOS	2-Oct-09	25	1000	0	150
27732	HTOL	0.6 um - 0.8 um BiCMOS	3-Nov-09	80	1000	0	125
27106	BAKE	0.6 um - 1.0 um	20-May-09	25	1000	0	150
27110	BAKE	0.6 um - 1.0 um	20-May-09	25	1000	0	150
27086	BAKE	0.6 um - 1.0 um	28-May-09	25	1000	0	150
27088	BAKE	0.6 um - 1.0 um	4-Jun-09	25	1000	0	150
27749	ELFR	0.6 um - 1.0 um	21-Sep-09	255	48	0	125
27748	ELFR	0.6 um - 1.0 um	22-Sep-09	255	48	0	125
27801	ELFR	0.6 um - 1.0 um	30-Sep-09	85	48	0	125
27634	BAKE	0.6 um - 1.0 um	6-Oct-09	25	1000	0	150
27651	BAKE	0.6 um - 1.0 um	8-Oct-09	25	1000	0	150
27655	BAKE	0.6 um - 1.0 um	8-Oct-09	25	1000	0	150
27888	ELFR	0.6 um - 1.0 um	19-Oct-09	255	48	0	125



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QLotNum	Stress	FabProcess	ReadDate	SampleSize	ReadPt	Fails	°C
27781	BAKE	0.6 um - 1.0 um	16-Dec-09	25	1000	0	150
27785	BAKE	0.6 um - 1.0 um	16-Dec-09	25	1000	0	150
27788	BAKE	0.6 um - 1.0 um	16-Dec-09	25	1000	0	150
27793	BAKE	0.6 um - 1.0 um	16-Dec-09	25	1000	0	150
28079	HTOL	0.6 um - 1.0 um	18-Feb-10	84	1000	0	125
28078	HTOL	0.6 um - 1.0 um	19-Feb-10	85	1000	0	125
28365	ELFR	0.6 um - 1.0 um	25-Feb-10	255	48	0	125
28266	BAKE	Diode	16-Mar-10	28	1000	0	85
28176	HTOL	Diode	18-Mar-10	85	1000	0	100
27358	HTOL	High Voltage	31-Jul-09	80	1000	0	125
27499	ELFR	High Voltage	4-Aug-09	496	48	0	125
27549	ELFR	High Voltage	7-Aug-09	502	48	0	125
27555	ELFR	High Voltage	11-Aug-09	500	48	0	125
27556	ELFR	High Voltage	15-Aug-09	500	48	0	125
27717	BAKE	High Voltage	19-Aug-09	25	1000	0	150
27721	BAKE	High Voltage	19-Aug-09	25	1000	0	150
27725	BAKE	High Voltage	19-Aug-09	25	1000	0	150
27937	ELFR	High Voltage	10-Nov-09	127	48	0	125
27936	ELFR	High Voltage	11-Nov-09	204	48	0	125
28044	ELFR	High Voltage	21-Dec-09	200	48	0	95
28043	ELFR	High Voltage	23-Dec-09	197	48	0	95
28045	ELFR	High Voltage	7-Jan-10	152	48	0	95
28046	ELFR	High Voltage	9-Jan-10	168	48	0	95
28371	ELFR	High Voltage	26-Feb-10	200	48	0	95
28372	ELFR	High Voltage	3-Mar-10	200	48	0	95



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Package Reliability Test Method and Conditions

Preconditioning (PC)

This test method is performed to simulate the various shipping conditions, the end use environment and customer board mounting process for a given packaging system. Preconditioning is an industry standard flow for non-hermetic (plastic) integrated circuit packages that is representative of a typical industry solder reflow operation. The test parts are subject to bake, moisture soak and three reflow cycles prior to being submitted to package reliability testing.

Temperature Cycling (TC)

This test evaluates potential reliability degradation due to thermal cycling effects. Devices are placed in a chamber using forced air to cycle devices between the specified temperature extremes. This test is conducted to determine the ability of components and solder interconnects to withstand mechanical stresses induced by alternating high and low temperature extremes. Permanent changes in electrical and/or physical characteristics can result from these mechanical stresses.

Temperature Humidity and Bias (THB)

This test evaluates the reliability of non-hermetic packaged integrated circuits in humid environments. It employs severe conditions of temperature, humidity and bias to accelerate the penetration of moisture through the external protective material (encapsulant) or along the interface between the external protective material and the metallic conductors passing through it. This test is less accelerated than autoclave and unbiased HAST and takes longer to complete. It provides more realistic results in line with actual field performance. The dominant failure mechanism is aluminum corrosion accelerated by moisture, bias and contamination.

Highly-Accelerated Temperature and Humidity Stress Test (HAST)

This test evaluates the reliability of non-hermetic packaged integrated circuits in humid environments. It employs severe conditions of temperature, humidity, and bias which accelerate the penetration of moisture through the external protective material (encapsulant or seal) or along the interface between the external protective material and the metallic conductors which pass through it. The stress usually activates the same failure mechanisms as the "85/85" Temperature Humidity and Bias (THB) test.

Pressure, Temperature and Humidity (PTH)/Pressure Cooker Test (PCT)/Autoclave (Au)

Autoclave testing is performed to evaluate the reliability of non-hermetic packaged integrated circuits in humid environments. It employs severe conditions of temperature, humidity and pressure to accelerate the penetration of moisture through the external protective material (encapsulant) or along the interface between the external protective material and the metallic conductors passing through it. The dominant failure mechanism is corrosion of internal materials.

Unbiased Highly-Accelerated Stress Test (U-HAST)

This test is performed to evaluate the reliability of non-hermetic packaged integrated circuits in humid environments. It is an alternate to Autoclave and tests for the same failure mechanisms. It employs severe conditions of temperature, humidity, and pressure to accelerate the penetration of moisture through the external protective material (encapsulant) or along the interface between the external protective material and the metallic conductors passing through it. UHAST is preferred over the autoclave stress method due to the reduction in artifacts induced by the 100%rh environment of autoclave, such as lead corrosion or contamination transfer by liquid water. The dominant failure mechanism is corrosion of internal materials.



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Reflow Profile and Moisture Sensitivity Level

Overview

Non-hermetic (plastic) integrated circuit packages are classified by moisture sensitivity level according to IPC/JEDEC J-Std-020. It is critical for final product quality that the board assembly process account for package moisture sensitivity, especially the peak reflow temperature and the maximum manufacturing expose time (MET).

Reflow Profile

Non-hermetic integrated circuit SMD (surface mount devices) are qualified in compliance to the applicable reflow profiles provided in IPC/JEDEC J-Std-020. The board assembler should not exceed the limits defined in the reflow profile tables of IPC/JEDEC J-Std-020.

Moisture Sensitivity Level

The MSL level and peak reflow temperatures are indicated on each product packing label.



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Reliability Monitor Report – Package Stresses

QLotNum	Stress	PkgType	Read Date	Sample Size	Read Point	Fails
27650	TEMPCYCLE	5-SOT23-LF	09-Sep-09	25	500	0
27654	TEMPCYCLE	5-SOT23-LF	09-Sep-09	25	500	0
27650	TEMPCYCLE	5-SOT23-LF	09-Sep-09	25	500	0
27654	TEMPCYCLE	5-SOT23-LF	09-Sep-09	25	500	0
27711	HAST	5-SOT23-LF	16-Sep-09	25	96	0
27712	HAST	5-SOT23-LF	16-Sep-09	25	96	0
27711	HAST	5-SOT23-LF	16-Sep-09	25	96	0
27712	HAST	5-SOT23-LF	16-Sep-09	25	96	0
27789	TEMPCYCLE	5-SOT23-LF	18-Nov-09	25	500	0
27792	TEMPCYCLE	5-SOT23-LF	19-Nov-09	25	500	0
27159	TEMPCYCLE	6-DFN-3.2X4.0-LF	14-Apr-09	80	500	0
27158	HAST	6-DFN-3.2X4.0-LF	20-Apr-09	76	96	0
27251	HAST	6-DFN-3.2X4.0-LF	11-May-09	80	96	0
27252	TEMPCYCLE	6-DFN-3.2X4.0-LF	11-May-09	80	500	0
27251	HAST	6-DFN-3.2X4.0-LF	11-May-09	80	96	0
27252	TEMPCYCLE	6-DFN-3.2X4.0-LF	11-May-09	80	500	0
27806	TEMPCYCLE	8-CLCC-5X7-LF	19-Oct-09	25	1000	0
27807	TEMPCYCLE	8-CLCC-5X7-LF	19-Oct-09	25	1000	0
27808	TEMPCYCLE	8-CLCC-5X7-LF	19-Oct-09	25	1000	0
27283	TEMPCYCLE	8-ESOIC-150-LF	20-May-09	28	500	0
27283	TEMPCYCLE	8-ESOIC-150-LF	20-May-09	28	500	0
27684	THB	8-ESOIC-150-LF	28-Oct-09	29	1000	0
27684	THB	8-ESOIC-150-LF	28-Oct-09	29	1000	0
28580	TEMPCYCLE	8-ESOIC-150-LF	25-Feb-10	45	500	0
27229	TEMPCYCLE	8-SOIC-150-LF	29-Apr-09	30	500	0
27229	TEMPCYCLE	8-SOIC-150-LF	29-Apr-09	30	500	0
27633	TEMPCYCLE	8-SOIC-150-LF	10-Sep-09	25	500	0
27635	TEMPCYCLE	8-SOIC-150-LF	10-Sep-09	25	500	0
27633	TEMPCYCLE	8-SOIC-150-LF	10-Sep-09	25	500	0
27635	TEMPCYCLE	8-SOIC-150-LF	10-Sep-09	25	500	0
27713	HAST	8-SOIC-150-LF	16-Sep-09	25	96	0
27714	HAST	8-SOIC-150-LF	16-Sep-09	25	96	0
27713	HAST	8-SOIC-150-LF	16-Sep-09	25	96	0
27714	HAST	8-SOIC-150-LF	16-Sep-09	25	96	0
27779	TEMPCYCLE	8-SOIC-150-LF	18-Nov-09	25	500	0
27784	TEMPCYCLE	8-SOIC-150-LF	18-Nov-09	25	500	0
27786	HAST	8-SOIC-150-LF	18-Nov-09	25	96	0
28309	HAST	8-SOIC-150-LF	15-Feb-10	30	96	0
28313	HAST	8-SOIC-150-LF	15-Feb-10	30	96	0
28312	TEMPCYCLE	8-SOIC-150-LF	17-Feb-10	30	500	0
28316	TEMPCYCLE	8-SOIC-150-LF	17-Feb-10	30	500	0
27976	TEMPCYCLE	10-DFN-3X3-LF	01-Dec-09	32	500	0
27209	TEMPCYCLE	10-MSOP-3.0-LF	05-May-09	25	500	0
27210	TEMPCYCLE	10-MSOP-3.0-LF	05-May-09	24	500	0
27199	HAST	10-MSOP-3.0-LF	07-May-09	25	96	0
27200	HAST	10-MSOP-3.0-LF	07-May-09	25	96	0
27201	HAST	10-MSOP-3.0-LF	07-May-09	25	96	0
27285	TEMPCYCLE	10-MSOP-3.0-LF	18-May-09	30	500	0
27284	TEMPCYCLE	10-MSOP-3.0-LF	20-May-09	30	500	0



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QLotNum	Stress	PkgType	Read Date	Sample Size	Read Point	Fails
27511	TEMPCYCLE	10-MSOP-3.0-LF	30-Jul-09	32	500	0
27583	TEMPCYCLE	10-MSOP-3.0-LF	19-Aug-09	32	500	0
27701	TEMPCYCLE	10-MSOP-3.0-LF	18-Sep-09	34	500	0
27977	TEMPCYCLE	10-MSOP-3.0-LF	01-Dec-09	32	500	0
27234	HAST	10-QFNCOL-2X2-LF	04-May-09	28	96	0
27236	TEMPCYCLE	10-QFNCOL-2X2-LF	04-May-09	28	500	0
27239	HAST	10-QFNCOL-2X2-LF	04-May-09	28	96	0
27241	TEMPCYCLE	10-QFNCOL-2X2-LF	04-May-09	28	500	0
27986	TEMPCYCLE	14-LGA-5X5-LF	04-Dec-09	30	500	0
27989	TEMPCYCLE	14-LGA-5X5-LF	04-Dec-09	30	500	0
27990	HAST	14-LGA-5X5-LF	04-Dec-09	30	96	0
27992	TEMPCYCLE	14-LGA-5X5-LF	04-Dec-09	30	500	0
27994	TEMPCYCLE	14-LGA-5X5-LF	04-Dec-09	30	500	0
27996	HAST	14-LGA-5X5-LF	04-Dec-09	30	96	0
28229	TEMPCYCLE	14-LGA-5X5-LF	11-Feb-10	30	500	0
28233	TEMPCYCLE	14-LGA-5X5-LF	11-Feb-10	30	500	0
28236	TEMPCYCLE	14-LGA-5X5-LF	11-Feb-10	30	500	0
28243	TEMPCYCLE	14-LGA-5X5-LF	11-Feb-10	30	500	0
28366	HAST	14-LGA-5X5-LF	03-Mar-10	29	96	0
28379	HAST	14-LGA-5X5-LF	03-Mar-10	30	96	0
28369	TEMPCYCLE	14-LGA-5X5-LF	04-Mar-10	29	500	0
28376	TEMPCYCLE	14-LGA-5X5-LF	04-Mar-10	30	500	0
28228	HAST	14-LGA-5X5-LF	06-Mar-10	30	96	0
28237	HAST	14-LGA-5X5-LF	06-Mar-10	30	96	0
27891	TEMPCYCLE	16-ESQIC-150-LF	16-Oct-09	22	750	0
27893	TEMPCYCLE	16-ESQIC-150-LF	16-Oct-09	22	750	0
27895	TEMPCYCLE	16-ESQIC-150-LF	16-Oct-09	22	750	0
27104	UHAST	16-PDIP-300-LF	15-Apr-09	25	96	0
27108	UHAST	16-PDIP-300-LF	15-Apr-09	24	96	0
27105	TEMPCYCLE	16-PDIP-300-LF	28-Apr-09	25	500	0
27109	TEMPCYCLE	16-PDIP-300-LF	28-Apr-09	25	500	0
28278	HAST	16-QSOP-150-LF	10-Feb-10	30	96	0
28279	HAST	16-QSOP-150-LF	10-Feb-10	30	96	0
28272	TEMPCYCLE	16-QSOP-150-LF	13-Feb-10	30	500	0
28273	TEMPCYCLE	16-QSOP-150-LF	13-Feb-10	29	500	0
28420	HAST	16-QSOP-150-LF	17-Mar-10	30	96	0
28421	HAST	16-QSOP-150-LF	17-Mar-10	30	96	0
28418	TEMPCYCLE	16-QSOP-150-LF	18-Mar-10	29	500	0
28419	TEMPCYCLE	16-QSOP-150-LF	18-Mar-10	30	500	0
28426	TEMPCYCLE	16-QSOP-150-LF	18-Mar-10	30	500	0
28427	TEMPCYCLE	16-QSOP-150-LF	18-Mar-10	30	500	0
28412	HAST	16-QSOP-150-LF	26-Mar-10	30	96	0
28413	HAST	16-QSOP-150-LF	26-Mar-10	30	96	0
27700	TEMPCYCLE	16-SOIC-150-LF	18-Sep-09	32	500	0
27975	TEMPCYCLE	16-SOIC-150-LF	01-Dec-09	32	500	0
28096	HAST	16-SOIC-150-LF	19-Jan-10	30	96	0
28095	TEMPCYCLE	16-SOIC-150-LF	21-Jan-10	30	500	0
28097	TEMPCYCLE	16-SOIC-150-LF	21-Jan-10	30	500	0
28099	TEMPCYCLE	16-SOIC-150-LF	21-Jan-10	30	500	0
28100	TEMPCYCLE	16-SOIC-150-LF	21-Jan-10	30	500	0
28102	HAST	16-SOIC-150-LF	21-Jan-10	30	96	0



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QLotNum	Stress	PkgType	Read Date	Sample Size	Read Point	Fails
28255	HAST	16-SOIC-150-LF	10-Feb-10	30	96	0
28246	TEMPCYCLE	16-SOIC-150-LF	11-Feb-10	30	500	0
28247	HAST	16-SOIC-150-LF	11-Feb-10	30	96	0
28248	HAST	16-SOIC-150-LF	11-Feb-10	30	96	0
28253	TEMPCYCLE	16-SOIC-150-LF	11-Feb-10	30	500	0
28254	TEMPCYCLE	16-SOIC-150-LF	11-Feb-10	30	500	0
28256	HAST	16-SOIC-150-LF	11-Feb-10	30	96	0
28245	TEMPCYCLE	16-SOIC-150-LF	03-Mar-10	30	500	0
27743	HAST	16-SOIC-300-LF	25-Sep-09	29	96	0
27745	TEMPCYCLE	16-SOIC-300-LF	25-Sep-09	29	500	0
27744	TEMPCYCLE	16-SOIC-300-LF	29-Sep-09	31	500	0
27746	HAST	16-SOIC-300-LF	29-Sep-09	30	96	0
28261	TEMPCYCLE	16-SOIC-300-LF	11-Feb-10	80	500	0
28262	HAST	16-SOIC-300-LF	13-Feb-10	80	96	0
28340	HAST	16-SOIC-300-LF	22-Feb-10	80	96	0
28343	TEMPCYCLE	16-SOIC-300-LF	09-Mar-10	80	500	0
28458	TEMPCYCLE	16-SOIC-300-LF	18-Mar-10	80	500	0
28344	HAST	16-SOIC-300-LF	24-Mar-10	77	96	0
28469	TEMPCYCLE	16-SOIC-300-LF	24-Mar-10	80	500	0
27300	UHAST	20-QFN-3X3-LF	14-Jun-09	80	96	0
27299	UHAST	20-QFN-3X3-LF	14-Aug-09	80	96	0
27298	UHAST	20-QFN-3X3-LF	30-Aug-09	75	96	0
27296	TEMPCYCLE	20-QFN-3X3-LF	15-Sep-09	78	500	0
27295	TEMPCYCLE	20-QFN-3X3-LF	18-Sep-09	77	500	0
27297	TEMPCYCLE	20-QFN-3X3-LF	18-Sep-09	77	500	0
27301	HAST	20-QFN-3X3-LF	18-Sep-09	79	96	0
27670	HAST	20-QFN-4X4-LF	21-Sep-09	25	96	0
28169	TEMPCYCLE	20-QFN-4X4-LF	22-Feb-10	80	500	0
28171	TEMPCYCLE	20-QFN-4X4-LF	22-Feb-10	80	500	0
27373	UHAST	20-QSOP-150-LF	22-Jun-09	25	96	0
27377	UHAST	20-QSOP-150-LF	22-Jun-09	25	96	0
27379	UHAST	20-QSOP-150-LF	22-Jun-09	24	96	0
27371	TEMPCYCLE	20-QSOP-150-LF	08-Jul-09	25	500	0
27375	TEMPCYCLE	20-QSOP-150-LF	08-Jul-09	25	500	0
27380	TEMPCYCLE	20-QSOP-150-LF	08-Jul-09	25	500	0
27500	TEMPCYCLE	20-TSSOP-4.4-LF	07-Aug-09	80	1000	0
27501	TEMPCYCLE	20-TSSOP-4.4-LF	07-Aug-09	80	1000	0
28411	TEMPCYCLE	20-UQFN-3X3-LF	18-Mar-10	43	500	0
27386	UHAST	24-PDIP-300-LF	18-Jun-09	25	96	0
27389	UHAST	24-PDIP-300-LF	18-Jun-09	25	96	0
27395	UHAST	24-PDIP-300-LF	18-Jun-09	25	96	0
27385	TEMPCYCLE	24-PDIP-300-LF	07-Jul-09	25	500	0
27390	TEMPCYCLE	24-PDIP-300-LF	07-Jul-09	25	500	0
27394	TEMPCYCLE	24-PDIP-300-LF	07-Jul-09	25	500	0
26831	HAST	24-QFN-4X4-LF	02-Apr-09	78	96	0
27173	TEMPCYCLE	24-QFN-4X4-LF	29-Apr-09	77	500	0
27178	TEMPCYCLE	24-QFN-4X4-LF	29-Apr-09	78	500	0
27181	TEMPCYCLE	24-QFN-4X4-LF	29-Apr-09	78	500	0
27176	UHAST	24-QFN-4X4-LF	01-Jun-09	78	192	0
27177	UHAST	24-QFN-4X4-LF	01-Jun-09	78	192	0
27184	UHAST	24-QFN-4X4-LF	01-Jun-09	78	192	0



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QLotNum	Stress	PkgType	Read Date	Sample Size	Read Point	Fails
27293	UHAST	24-QFN-4X4-LF	19-Jun-09	78	192	0
27175	HAST	24-QFN-4X4-LF	24-Jun-09	77	192	0
27180	HAST	24-QFN-4X4-LF	24-Jun-09	75	192	0
27183	HAST	24-QFN-4X4-LF	24-Jun-09	78	192	0
27558	TEMPCYCLE	24-QFN-4X4-LF	10-Aug-09	14	500	0
27460	HAST	24-QFN-4X4-LF	11-Sep-09	104	192	0
27461	HAST	24-QFN-4X4-LF	11-Sep-09	330	192	0
27884	TEMPCYCLE	24-QFN-4X4-LF	10-Nov-09	80	750	0
27513	TEMPCYCLE	24-QSOP-150-LF	03-Aug-09	30	500	0
27514	TEMPCYCLE	24-QSOP-150-LF	03-Aug-09	30	500	0
27682	TEMPCYCLE	24-QSOP-150-LF	11-Sep-09	38	500	0
27681	TEMPCYCLE	24-QSOP-150-LF	14-Sep-09	35	500	0
27613	TEMPCYCLE	24-QSOP-150-LF	24-Sep-09	81	500	0
27614	HAST	24-QSOP-150-LF	24-Sep-09	82	96	0
27615	UHAST	24-QSOP-150-LF	24-Sep-09	83	96	0
27616	TEMPCYCLE	24-QSOP-150-LF	24-Sep-09	82	500	0
27617	HAST	24-QSOP-150-LF	24-Sep-09	82	96	0
27612	UHAST	24-QSOP-150-LF	26-Sep-09	81	96	0
27873	TEMPCYCLE	24-QSOP-150-LF	28-Oct-09	30	500	0
27875	TEMPCYCLE	24-QSOP-150-LF	29-Oct-09	32	500	0
28082	UHAST	24-QSOP-150-LF	13-Jan-10	82	96	0
28083	TEMPCYCLE	24-QSOP-150-LF	13-Jan-10	82	500	0
28084	HAST	24-QSOP-150-LF	13-Jan-10	82	96	0
27319	HAST	29-LGA-3.5X5.5-LF	01-Jun-09	30	96	0
27320	HAST	29-LGA-3.5X5.5-LF	01-Jun-09	30	96	0
27741	HAST	32-LGA-5X5-LF	22-Sep-09	25	96	0
27739	TEMPCYCLE	32-LGA-5X5-LF	28-Sep-09	25	500	0
27924	HAST	32-LGA-5X5-LF	12-Nov-09	27	96	0
27925	TEMPCYCLE	32-LGA-5X5-LF	13-Nov-09	27	500	0
27702	HAST	32-QFN-5X5-LF	14-Sep-09	27	96	0
27877	HAST	32-QFN-5X5-LF	22-Oct-09	27	96	0
27878	TEMPCYCLE	32-QFN-5X5-LF	02-Nov-09	27	500	0
28091	TEMPCYCLE	32-QFN-5X5-LF	20-Jan-10	31	500	0
28212	HAST	32-QFN-5X5-LF	04-Feb-10	31	96	0
28213	HAST	32-QFN-5X5-LF	04-Feb-10	29	96	0
28090	TEMPCYCLE	32-QFN-5X5-LF	05-Feb-10	22	500	0
27622	HAST	36-QFN-5X6-LF	01-Sep-09	44	96	0
27627	HAST	36-QFN-5X6-LF	01-Sep-09	45	96	0
27629	HAST	36-QFN-5X6-LF	01-Sep-09	45	96	0
27623	HAST	36-QFN-5X6-LF	21-Sep-09	44	96	0
27624	HAST	36-QFN-5X6-LF	21-Sep-09	45	96	0
27628	HAST	36-QFN-5X6-LF	21-Sep-09	45	96	0
27527	TEMPCYCLE	36-QFN-6X6-LF	09-Sep-09	25	500	0
27531	HAST	36-QFN-6X6-LF	09-Sep-09	25	96	0
27533	TEMPCYCLE	36-QFN-6X6-LF	09-Sep-09	25	500	0
27535	TEMPCYCLE	36-QFN-6X6-LF	09-Sep-09	25	500	0
27537	HAST	36-QFN-6X6-LF	09-Sep-09	25	96	0



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27092	UHAST	36-SSOP-300-LF	23-Apr-09	25	96	0
27094	UHAST	36-SSOP-300-LF	23-Apr-09	25	96	0
27089	TEMPCYCLE	36-SSOP-300-LF	05-May-09	23	500	0
27091	TEMPCYCLE	36-SSOP-300-LF	05-May-09	25	500	0
27436	UHAST	36-SSOP-300-LF	16-Jul-09	31	96	0
27437	UHAST	36-SSOP-300-LF	16-Jul-09	31	96	0
27438	UHAST	36-SSOP-300-LF	16-Jul-09	31	96	0
27433	HAST	36-SSOP-300-LF	17-Jul-09	29	96	0
27435	HAST	36-SSOP-300-LF	17-Jul-09	29	96	0
27718	UHAST	36-SSOP-300-LF	17-Jul-09	25	96	0
27722	UHAST	36-SSOP-300-LF	17-Jul-09	25	96	0
27726	UHAST	36-SSOP-300-LF	17-Jul-09	25	96	0
27718	UHAST	36-SSOP-300-LF	17-Jul-09	25	96	0
27722	UHAST	36-SSOP-300-LF	17-Jul-09	25	96	0
27726	UHAST	36-SSOP-300-LF	17-Jul-09	25	96	0
27434	HAST	36-SSOP-300-LF	21-Jul-09	29	96	0
27434	HAST	36-SSOP-300-LF	21-Jul-09	29	96	0
27716	TEMPCYCLE	36-SSOP-300-LF	25-Jul-09	25	1000	0
27720	TEMPCYCLE	36-SSOP-300-LF	25-Jul-09	25	1000	0
27724	TEMPCYCLE	36-SSOP-300-LF	25-Jul-09	25	1000	0
27716	TEMPCYCLE	36-SSOP-300-LF	25-Jul-09	25	1000	0
27720	TEMPCYCLE	36-SSOP-300-LF	25-Jul-09	25	1000	0
27724	TEMPCYCLE	36-SSOP-300-LF	25-Jul-09	25	1000	0
27071	THB	38-QFN-5X7-LF	23-Apr-09	30	1000	0
27072	THB	38-QFN-5X7-LF	23-Apr-09	30	1000	0
27073	THB	38-QFN-5X7-LF	23-Apr-09	30	1000	0
27074	THB	38-QFN-5X7-LF	23-Apr-09	30	1000	0
27071	THB	38-QFN-5X7-LF	23-Apr-09	30	1000	0
27072	THB	38-QFN-5X7-LF	23-Apr-09	30	1000	0
27073	THB	38-QFN-5X7-LF	23-Apr-09	30	1000	0
27074	THB	38-QFN-5X7-LF	23-Apr-09	30	1000	0
28567	TEMPCYCLE	38-QFN-5X7-LF	25-Sep-09	45	500	0
28569	TEMPCYCLE	38-QFN-5X7-LF	25-Sep-09	45	500	0
28571	TEMPCYCLE	38-QFN-5X7-LF	25-Sep-09	45	500	0
28574	TEMPCYCLE	38-QFN-5X7-LF	25-Sep-09	45	500	0
28576	TEMPCYCLE	38-QFN-5X7-LF	25-Sep-09	45	500	0
28578	TEMPCYCLE	38-QFN-5X7-LF	25-Sep-09	45	500	0
27024	TEMPCYCLE	40-QFN-6X6-LF	21-Apr-09	27	701	0
27024	TEMPCYCLE	40-QFN-6X6-LF	21-Apr-09	27	701	0
27690	TEMPCYCLE	40-QFN-6X6-LF	16-Sep-09	26	500	0
27690	TEMPCYCLE	40-QFN-6X6-LF	16-Sep-09	26	500	0
27699	TEMPCYCLE	40-QFN-6X6-LF	22-Sep-09	26	701	0
27710	HAST	40-QFN-6X6-LF	22-Sep-09	26	96	0
27699	TEMPCYCLE	40-QFN-6X6-LF	22-Sep-09	26	701	0
27710	HAST	40-QFN-6X6-LF	22-Sep-09	26	96	0
28157	TEMPCYCLE	40-QFN-6X6-LF	20-Jan-10	78	500	0
28156	HAST	40-QFN-6X6-LF	30-Jan-10	78	96	0
28159	HAST	40-QFN-6X6-LF	30-Jan-10	78	96	0



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27151	TEMPCYCLE	42-QFN-5X7-LF	09-Apr-09	30	500	0
27151	TEMPCYCLE	42-QFN-5X7-LF	09-Apr-09	30	500	0
27150	HAST	42-QFN-5X7-LF	21-Apr-09	28	96	0
27150	HAST	42-QFN-5X7-LF	21-Apr-09	28	96	0
27214	TEMPCYCLE	42-QFN-5X7-LF	29-Apr-09	30	500	0
27214	TEMPCYCLE	42-QFN-5X7-LF	29-Apr-09	30	500	0
27469	HAST	42-QFN-5X7-LF	17-Jul-09	26	96	0
27469	HAST	42-QFN-5X7-LF	17-Jul-09	26	96	0
27471	TEMPCYCLE	42-QFN-5X7-LF	21-Jul-09	27	500	0
27471	TEMPCYCLE	42-QFN-5X7-LF	21-Jul-09	27	500	0
27548	HAST	42-QFN-5X7-LF	05-Aug-09	26	96	0
27548	HAST	42-QFN-5X7-LF	05-Aug-09	26	96	0
27546	TEMPCYCLE	42-QFN-5X7-LF	11-Aug-09	27	500	0
27546	TEMPCYCLE	42-QFN-5X7-LF	11-Aug-09	27	500	0
27581	HAST	42-QFN-5X7-LF	24-Aug-09	26	96	0
27581	HAST	42-QFN-5X7-LF	24-Aug-09	26	96	0
27582	TEMPCYCLE	42-QFN-5X7-LF	28-Aug-09	27	500	0
27582	TEMPCYCLE	42-QFN-5X7-LF	28-Aug-09	27	500	0
28064	TEMPCYCLE	42-QFN-5X7-LF	08-Jan-10	32	500	0
27001	THB	44-QFN-7X7-LF	14-May-09	30	1000	0
27001	THB	44-QFN-7X7-LF	14-May-09	30	1000	0
27545	HAST	48-QFN-7X7-LF	03-Aug-09	25	96	0
27545	HAST	48-QFN-7X7-LF	03-Aug-09	25	96	0
27543	TEMPCYCLE	48-QFN-7X7-LF	06-Aug-09	25	500	0
27543	TEMPCYCLE	48-QFN-7X7-LF	06-Aug-09	25	500	0
27595	HAST	48-QFN-7X7-LF	20-Aug-09	27	96	0
27595	HAST	48-QFN-7X7-LF	20-Aug-09	27	96	0
27593	TEMPCYCLE	48-QFN-7X7-LF	25-Aug-09	27	500	0
27593	TEMPCYCLE	48-QFN-7X7-LF	25-Aug-09	27	500	0
27703	TEMPCYCLE	48-QFN-7X7-LF	21-Sep-09	31	500	0
27703	TEMPCYCLE	48-QFN-7X7-LF	21-Sep-09	31	500	0
28307	HAST	48-QFN-7X7-LF	17-Feb-10	25	96	0
28306	TEMPCYCLE	48-QFN-7X7-LF	26-Feb-10	25	500	0
28430	TEMPCYCLE	48-QFN-7X7-LF	12-Mar-10	27	500	0
28429	HAST	48-QFN-7X7-LF	23-Mar-10	27	96	0
27775	TEMPCYCLE	48-TQFP-7X7-LF	06-Oct-09	31	500	0
27775	TEMPCYCLE	48-TQFP-7X7-LF	06-Oct-09	31	500	0
27279	HAST	100-TQFP-14X14-LF	18-May-09	28	96	0
27278	TEMPCYCLE	100-TQFP-14X14-LF	02-Jun-09	28	500	0



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Revision History

Rev No	Description	Effective Date
01	Original	29-Apr-2010