pSemi™
A Murata Company

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Quarterly Reliability Report

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Peregrine Semiconductor Reliability System

The Quarterly Reliability Report is a compilation of reliability stress test results that crosses the entire product & technology family of Peregrine Semiconductor Corporation products. Data is collected on a regular basis through the efforts of product and process qualifications, standard product monitoring and lot acceptance testing. To date, a total of **68,458 devices** have been tested in HTOL with a total of **6.04 billion equivalent device hours**. The overall failure rate for the pSemi family of products is **0.15 FIT.** (Using Eaa = 0.7eV, Tj=55°C at 60% UCL)

Peregrine Semiconductor reliability testing standards conform to industry standard qualification procedures as detailed in the JEDEC and/or Military Standard guidelines. In addition, where clear guidelines have not been established yet, Peregrine Semiconductor has developed stringent reliability requirements to ensure consistent high reliability performance.

Peregrine Semiconductor makes use of accelerated life testing results, along with thermal acceleration factors in the prediction of failure rates. High Temperature Operating Life (HTOL) stress testing is performed at accelerated voltage and temperature conditions which are based on MIL-STD-883 M1005.9 and Jedec JESD22 A108 standards. Resulting data collected from HTOL tests is de-rated to a typical use operating junction temperature (Tj) of 55°C. Early Life Failure Rate (ELFR) is derived after 48-hr performance.

Peregrine Semiconductor conducts an ongoing product reliability monitoring program to evaluate sample products from high volume, major product families on a quarterly basis. The reliability monitoring process is a continuously improving system within Peregrine Semiconductor as we strive for superior product knowledge and performance.

Peregrine Semiconductor performs the majority of Reliability testing using an ISO17025 certified test laboratories located in Irvine, CA and San Jose, CA. Regular auditing of the laboratory is performed to ensure compliance to ISO standards.

Failure Rate Calculation

Acceleration Factor (AF)

For a given failure mechanism, acceleration factor (AF), is the ratio of the time it takes for a certain fraction of the population to fail, following application of one stress or use condition, to the corresponding time at a more severe stress or use condition.

The industry uses the thermal acceleration model formula based on Arrhenius equation noted below:

$$AF\left(T_{use}, T_{stress}\right) := e^{\frac{E_{aa}}{k_B} \cdot \left(\frac{1}{T_{use}} - \frac{1}{T_{stress}}\right)}$$

where:

$E_{aa} := 0.7\ eV$,is the Apparent Activation Energy

$e = 2.718$, is the base of natural logarithm

$k_B := 8.62 \cdot 10^{-5}\ \frac{eV}{K}$, is the Boltzmann constant

T_{use} & T_{stress}, are the use and stress test temperatures, respectively, in Kelvin

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Sample Calculation

Find the Acceleration Factor (AF) with the following conditions.

(a) $T_{use} := 55\ °C$ and $T_{stress} := 125\ °C$

$$AF\left(T_{use}, T_{stress}\right) = 77.5$$

(b) $T_{use} := 55\ °C$ and $T_{stress} := 150\ °C$

$$AF\left(T_{use}, T_{stress}\right) = 258.7$$

Failure Rate Calculation (continued)

Failure in Time Calculation

Mean time to failure (M.T.T.F.) is defined as the average time it takes for a failure to occur. Failure in Time (F.I.T.) is the number of units predicted to fail in a billion ($1e^9$) device hours at a specified temperature. After the life test is completed and accelerated device hour data is calculated, the failure rate is estimated using the Chi-Square approximation (χ^2) as follows:

$$FIT = \left(\frac{\chi^{2(2r+2)}}{2 * EDH}\right) * 1e^9$$

where:

χ^2 = chi square function

r = number of failures

EDH = equivalent device hours (units tested x test hours x AF)

Sample Calculation

Given: Units Tested (Sample Size) = 231 devices
Test temperature = 150°C
Test duration = 500 hours
Failures = 0

EDH = (231 x 500 x 259.2) = 2.99E+7 equivalent device hours
χ^2 @ 60% confidence level and 0 failures = 1.83
FIT (60% confidence level) = [1.83 / (2 x 2.99E+7)] x 1.0E+9 = 30.6 FIT

Reliability Results
(FITs)

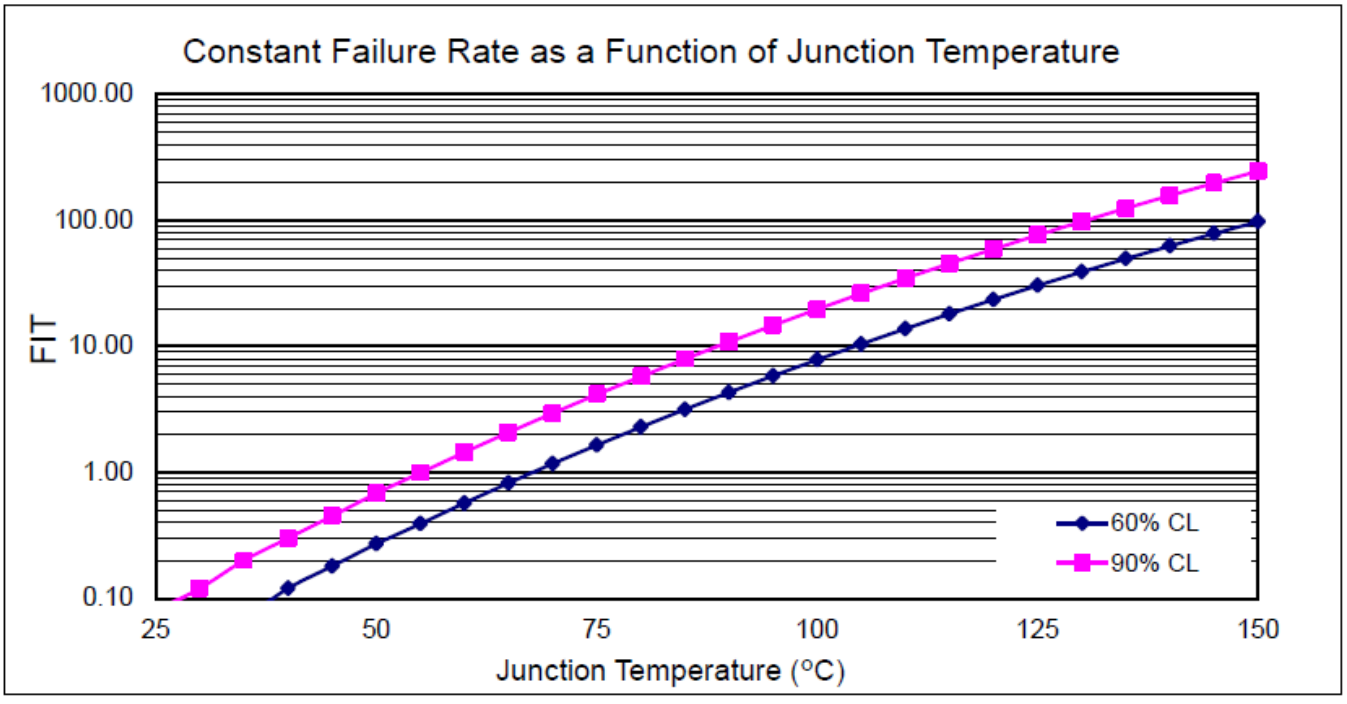
UltraCMOS® 2 Process Technology

Generation : 500 nm CMOS Silicon Epi Process (U500E)

Units Tested : 25,535

Product Family : ASW, HPSW, DSA, DC-DC, MXR, PLL, PSR

	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	2.03E+08	4.5	2.22E+08
Constant (Random)	2.31E+09	0.4	2.56E+09



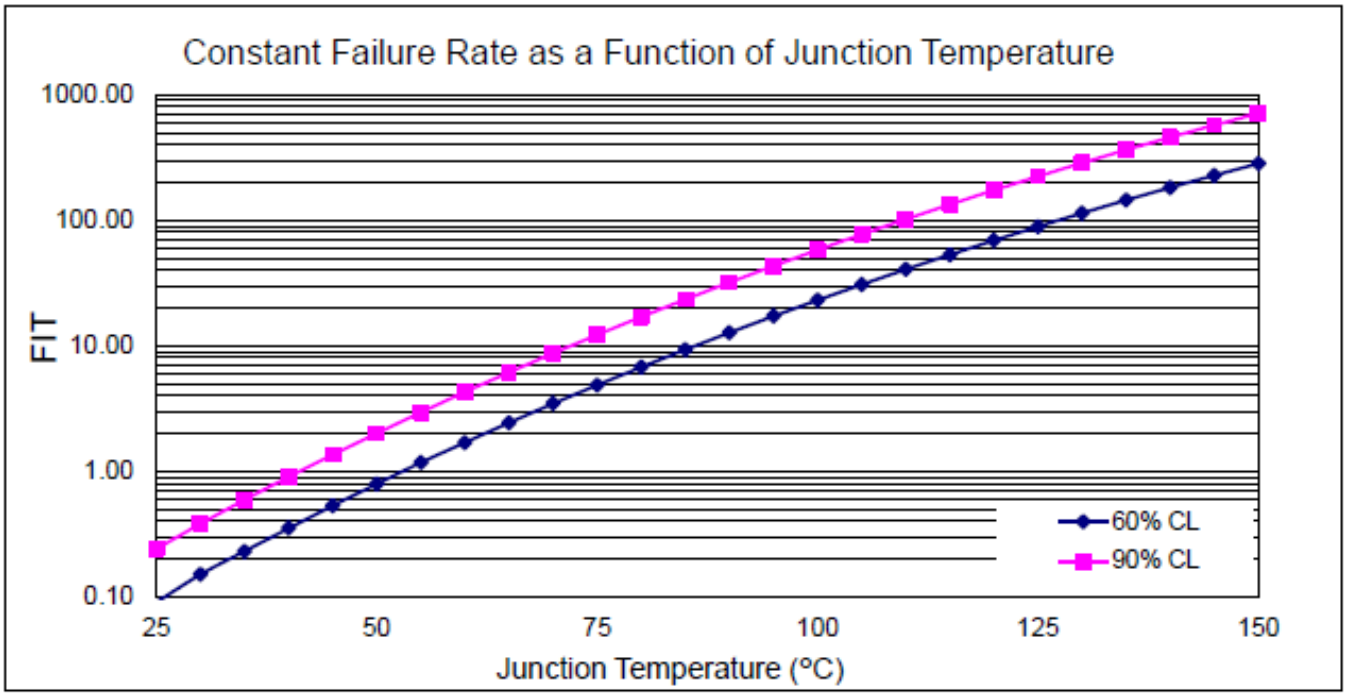
UltraCMOS® 3.5 Process Technology

Generation : 350 nm CMOS Silicon Epi Process (U350E)

Units Tested : 9,405

Product Family : ASW, HPSW, DTC, DSA, PSR

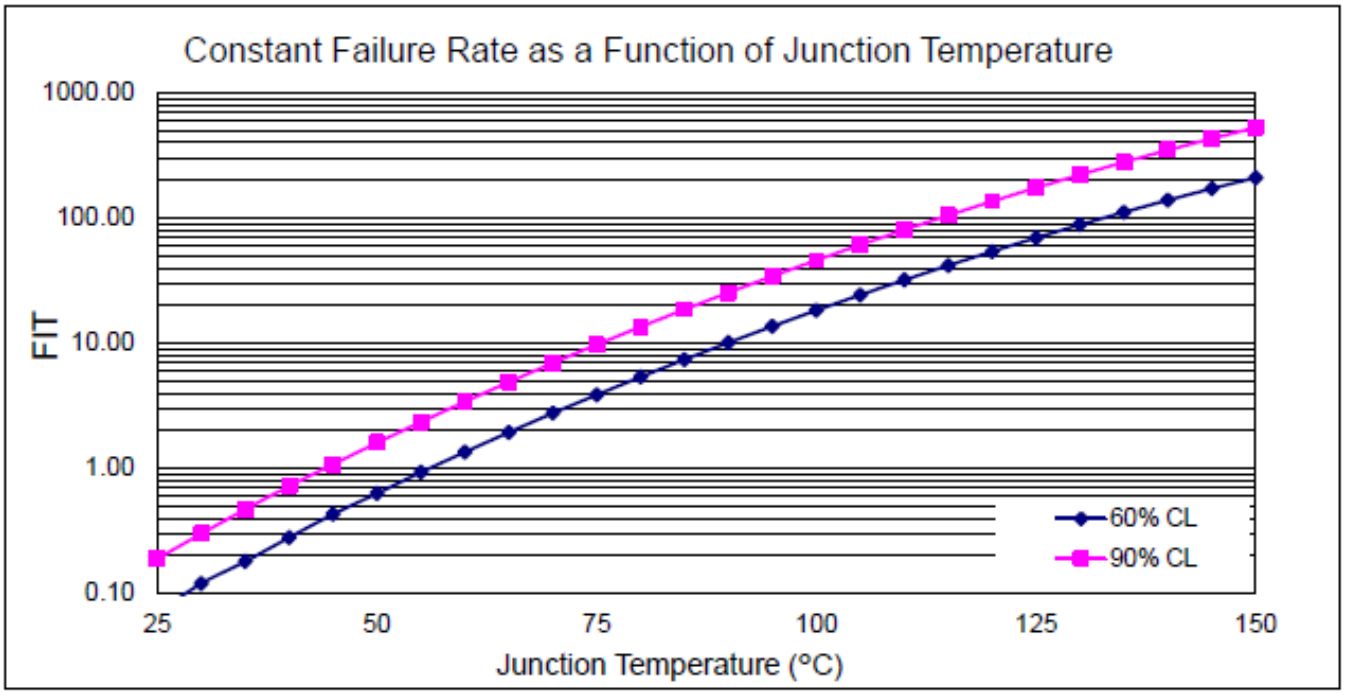
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	1.05E+08	8.8	1.14E+08
Constant (Random)	7.82E+08	1.2	8.55E+08



UltraCMOS® 5 Process Technology

Generation	:	350 nm CMOS Bonded Silicon Process (U350B)
Units Tested	:	8,338
Product Family	:	ASW, DSA, DTC, HPSW, LMTR, MPAC, PLL, PSH

	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	9.17E+07	10.0	1.00E+08
Constant (Random)	9.78E+08	0.9	1.08E+09



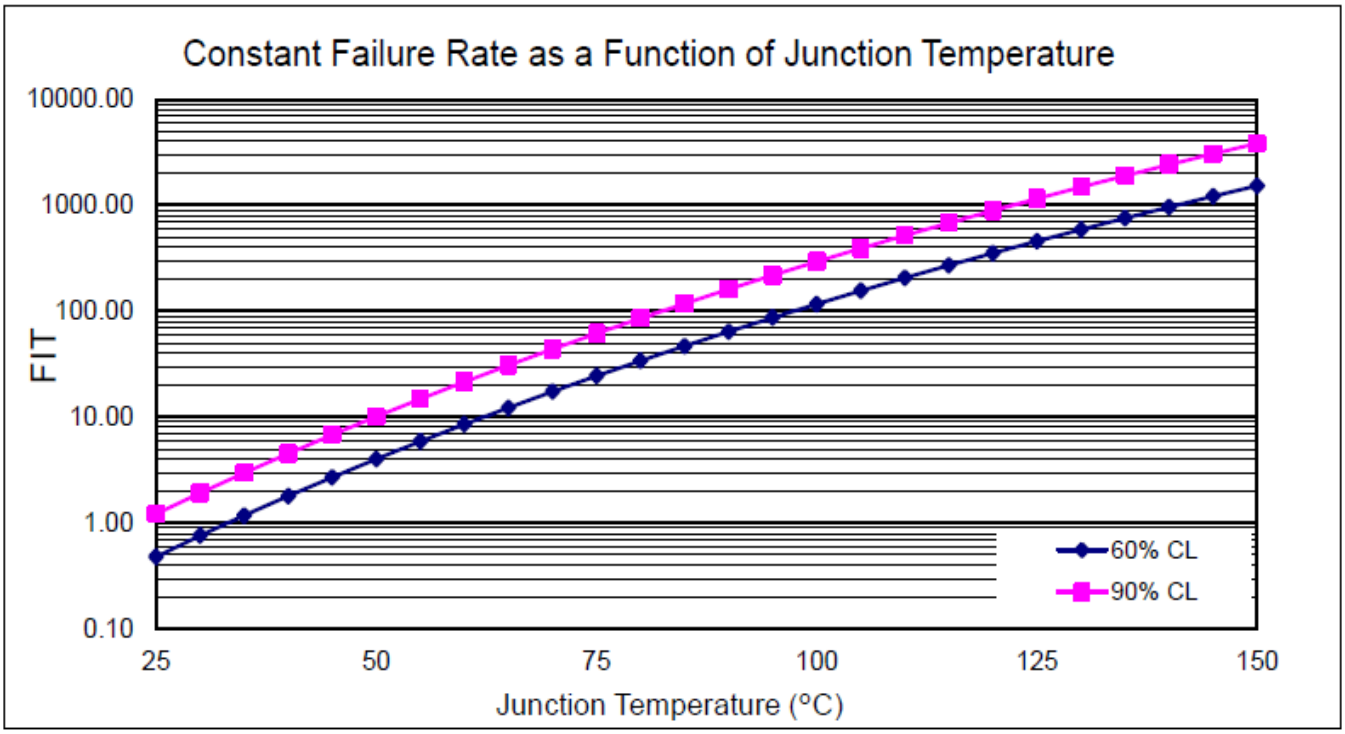
UltraCMOS® 6 Process Technology

Generation : 250 nm CMOS Silicon Epi Process (U250E2)

Units Tested : 1,230

Product Family : ASW, HPSW, PSR

	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	1.49E+07	61.5	1.63E+07
Constant (Random)	1.55E+08	5.9	1.70E+08



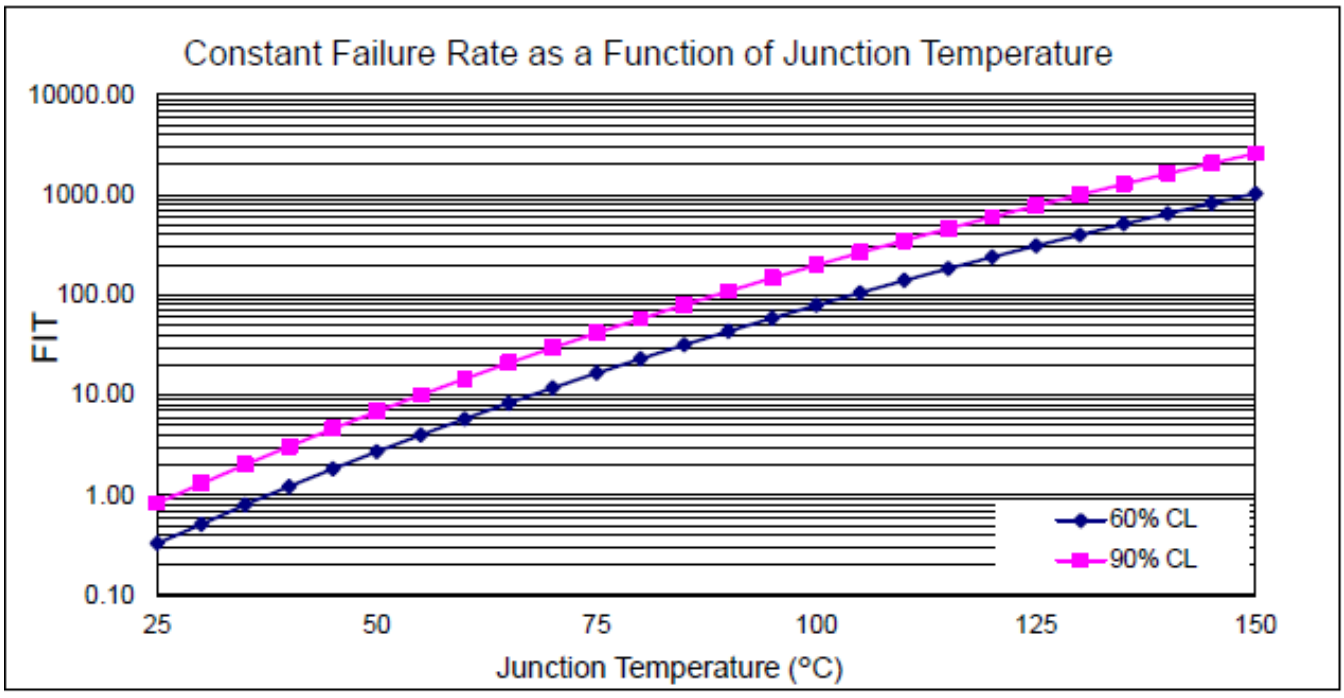
UltraCMOS® 6.5 Process Technology

Generation : 250 nm CMOS Silicon Epi Process (U250E4)

Units Tested : 1,910

Product Family : ASW, DSA, HPSW

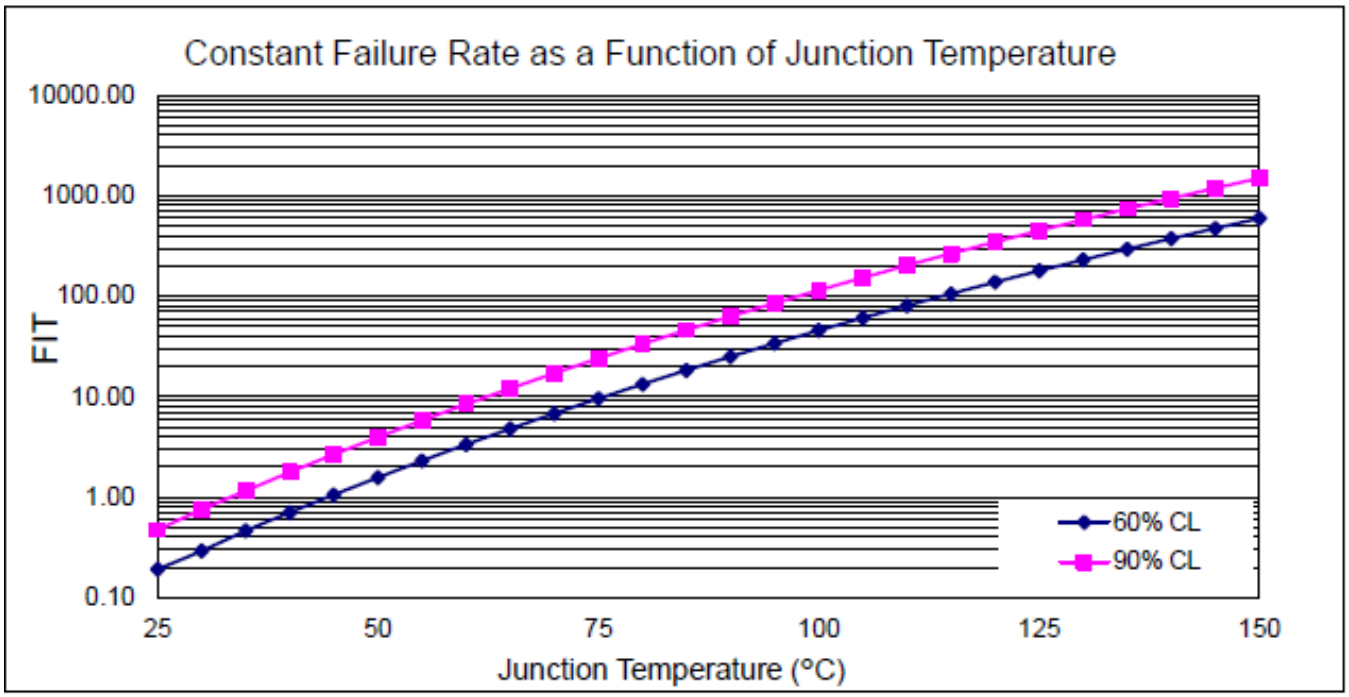
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	1.86E+07	49.2	2.03E+07
Constant (Random)	2.29E+08	4.0	2.51E+08



UltraCMOS® 8 Process Technology

Generation	: 250 nm CMOS Bonded Silicon Process (U250B)
Units Tested	: 3,271
Product Family	: ASW, DSA, DTC, HPSW, LMTR, MPAC, MXR, PSR, DRV

	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	3.67E+07	24.9	4.01E+07
Constant (Random)	3.99E+08	2.3	4.37E+08



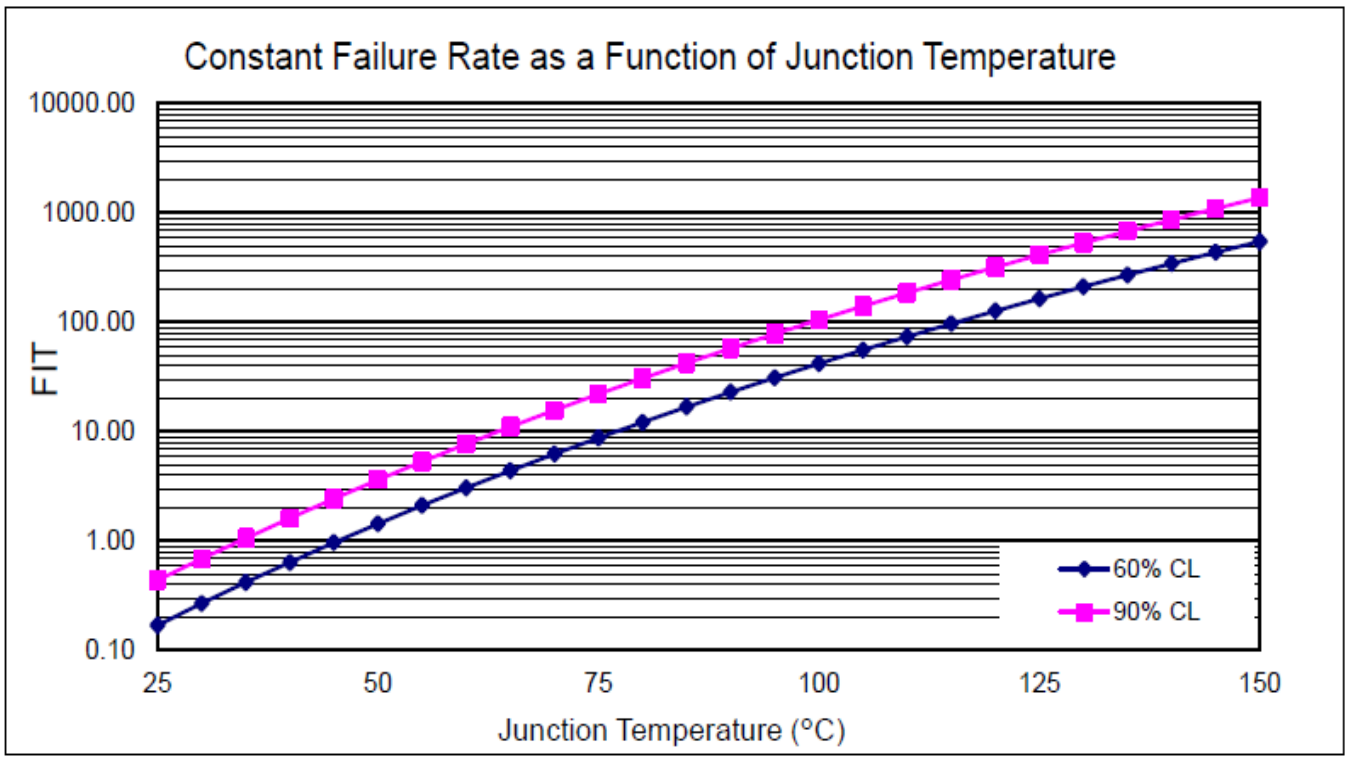
UltraCMOS® 10 Process Technology

Generation : 130nm CMOS Silicon-On-Insulator in 200mm wafer(U130S1)

Units Tested : 3,428

Product Family : ASW

	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	3.97E+07	23.1	4.33E+07
Constant (Random)	4.32E+08	2.1	4.72E+08



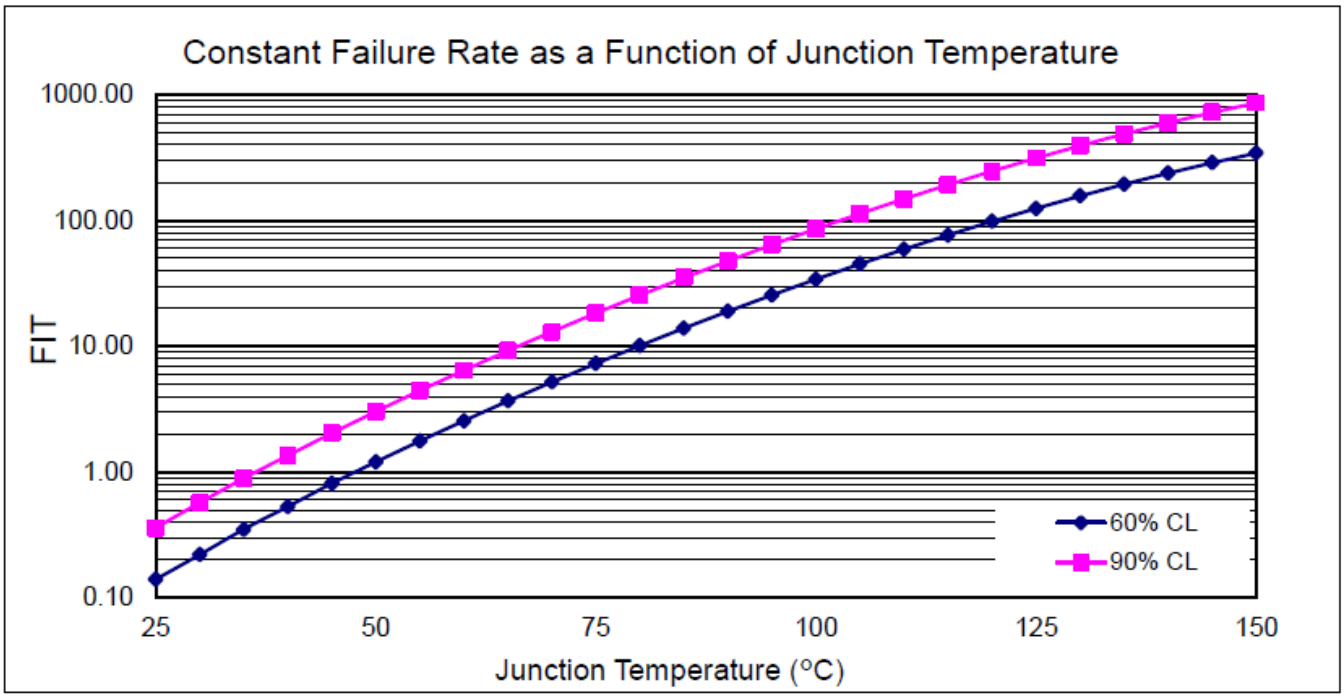
UltraCMOS® 11 Process Technology

Generation : 130nm CMOS Silicon-On-Insulator in 300mm wafer (U130S2)

Units Tested : 10,318

Product Family : ASW, HPSW, Amplifier (LNA, PA), DC-DC

	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	3.38E+07	27.1	3.69E+07
Constant (Random)	5.19E+08	1.8	5.68E+08



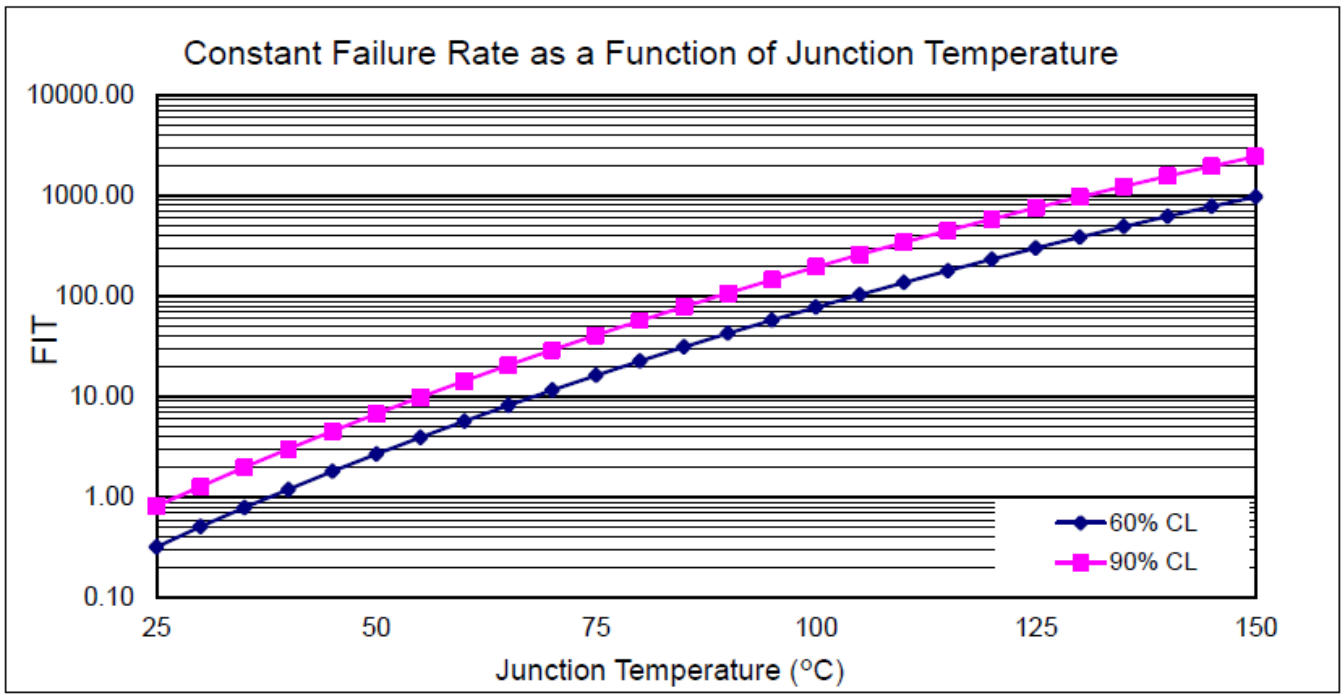
UltraCMOS® 12 Process Technology

Generation : 65nm CMOS Silicon-On-Insulator in 300mm wafer (U130S3)

Units Tested : 4,943

Product Family : ASW, PAC

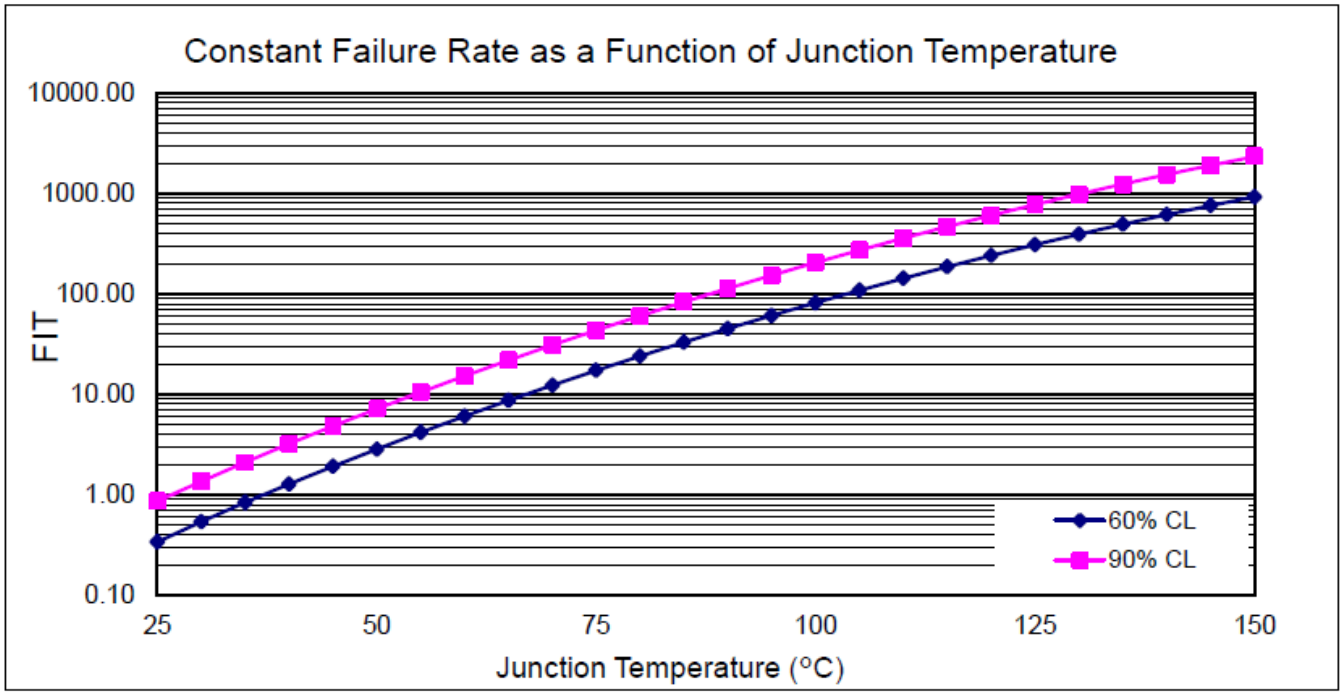
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	2.94E+07	31.2	3.21E+07
Constant (Random)	2.32E+08	3.9	2.54E+08



Amplifiers (LNA & PA)

Description	:	UltraCMOS Low-Noise Amplifiers (LNA) and Power Amplifiers (PA)
Products in Family	:	PE477181, PE478011, PE478021, PE478031, PE478070, PE479050, PE521221
Process Technology	:	UltraCMOS®11
Units Tested	:	5,681

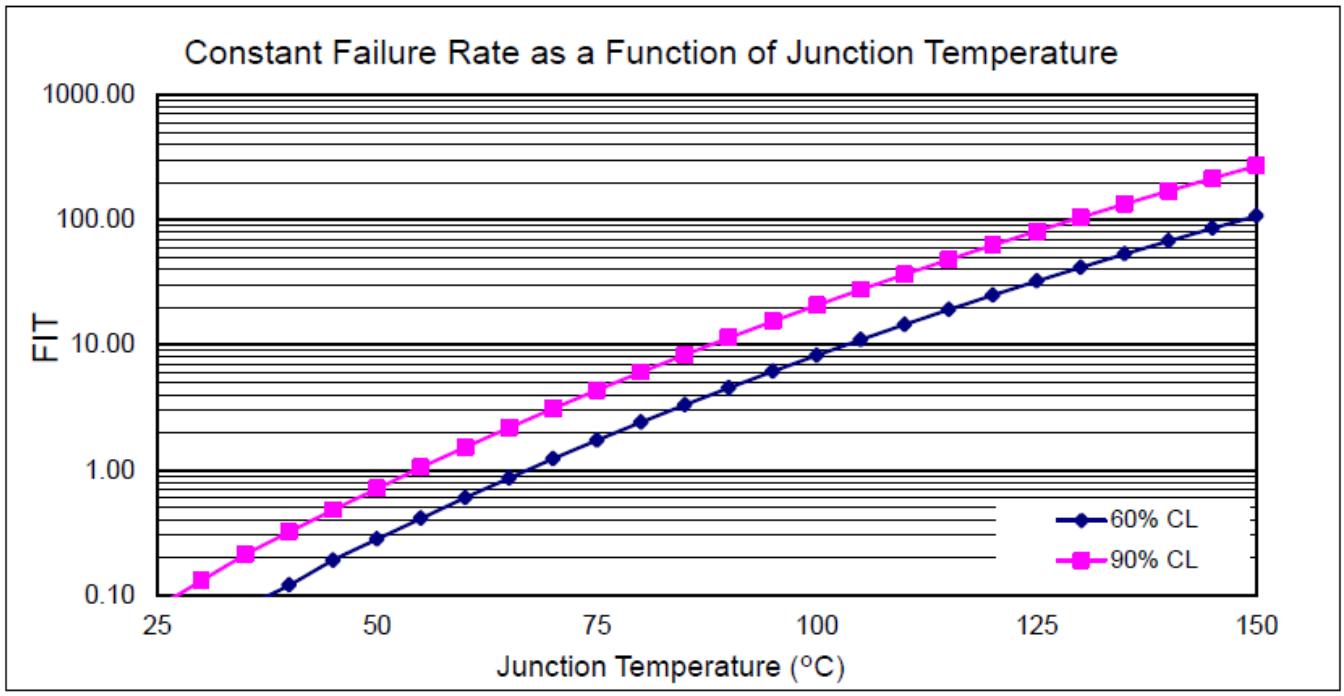
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	1.21E+07	75.8	1.32E+07
Constant (Random)	2.19E+08	4.2	2.39E+08



Antenna Switches (ASW)

Description	:	Multi-pole & multi-throw high power handling antenna switch products for Mobile Wireless RF and Test Equipment /ATE applications.
Products in Family	:	PE42108x, PE421120, PE42112x, PE42114x, PE42116x, PE421230, PE421240, PE42128x, PE42129x, PE421321, PE42145x, PE421510, PE421550, PE42159x, PE421603, PE42162x, PE421690, PE42170x, PE42171x, PE421729, PE421779, PE42181x, PE42188x, PE421890x, PE42194x, PE42195x, PE42197x, PE422020, PE423641, PE4255x, PE42614x, PE42615x, PE42616x, PE42617x, PE4261x, PE4263x, PE42641, PE4266x, PE4267x, PE426810, PE42682x, PE42684x, PE42685x, PE42688x, PE4268x, PE42695x, PE4269x, PE426x, PE613010, PE636030, PE636040,PE4211x
Process Technology	:	UltraCMOS® 2, UltraCMOS® 3.5, UltraCMOS® 5, UltraCMOS® 6, UltraCMOS® 6.5, UltraCMOS® 8, UltraCMOS®10, UltraCMOS®11, UltraCMOS®12
Units Tested	:	18,109

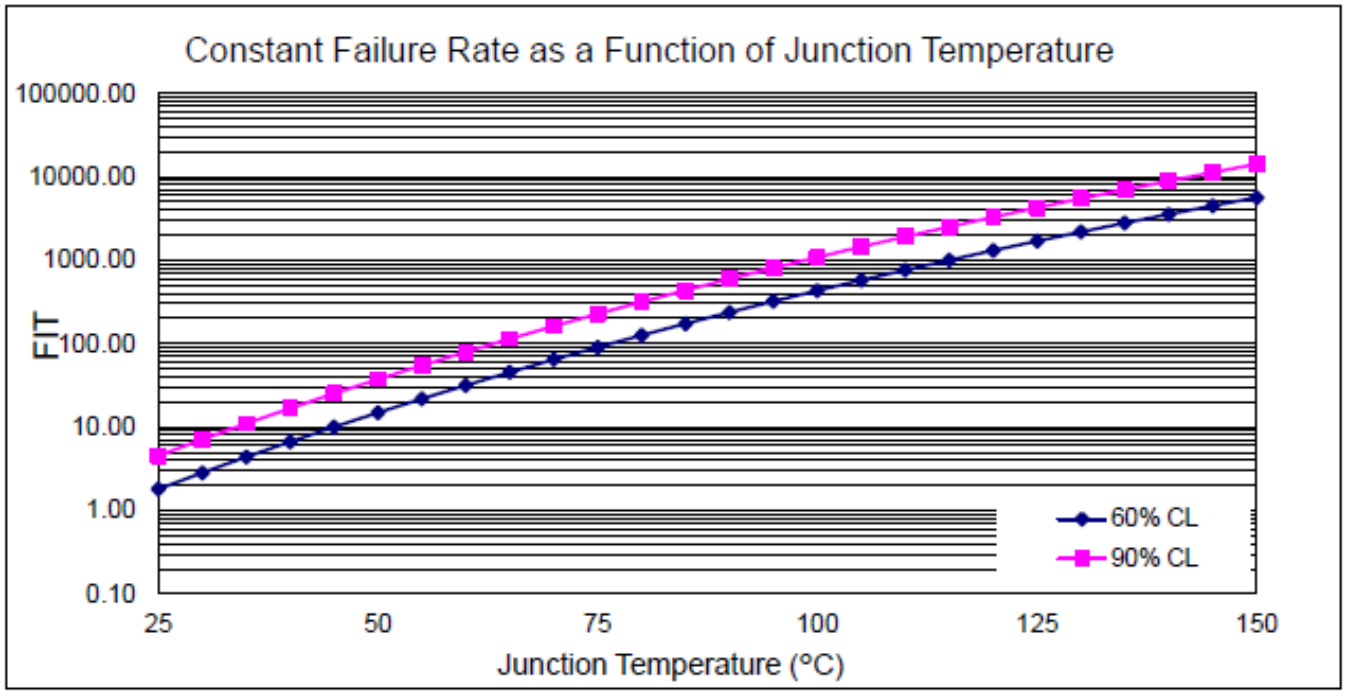
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	2.00E+08	4.6	2.19E+08
Constant (Random)	2.19E+09	0.4	2.44E+09



DC-DC Buck Regulators/Converters (DCDC)

Description	:	These devices are radiation-hardened point-of-load (POL) buck regulators with integrated switches suited for DC-DC converter applications. This monolithic technology replaces multi-chip modules by offering superior performance, smaller size and reduced weight in sensitive space applications.
Products in Family	:	PE9915x, PE22100
Process Technology	:	UltraCMOS® 2, UltraCMOS® 11
Units Tested	:	762

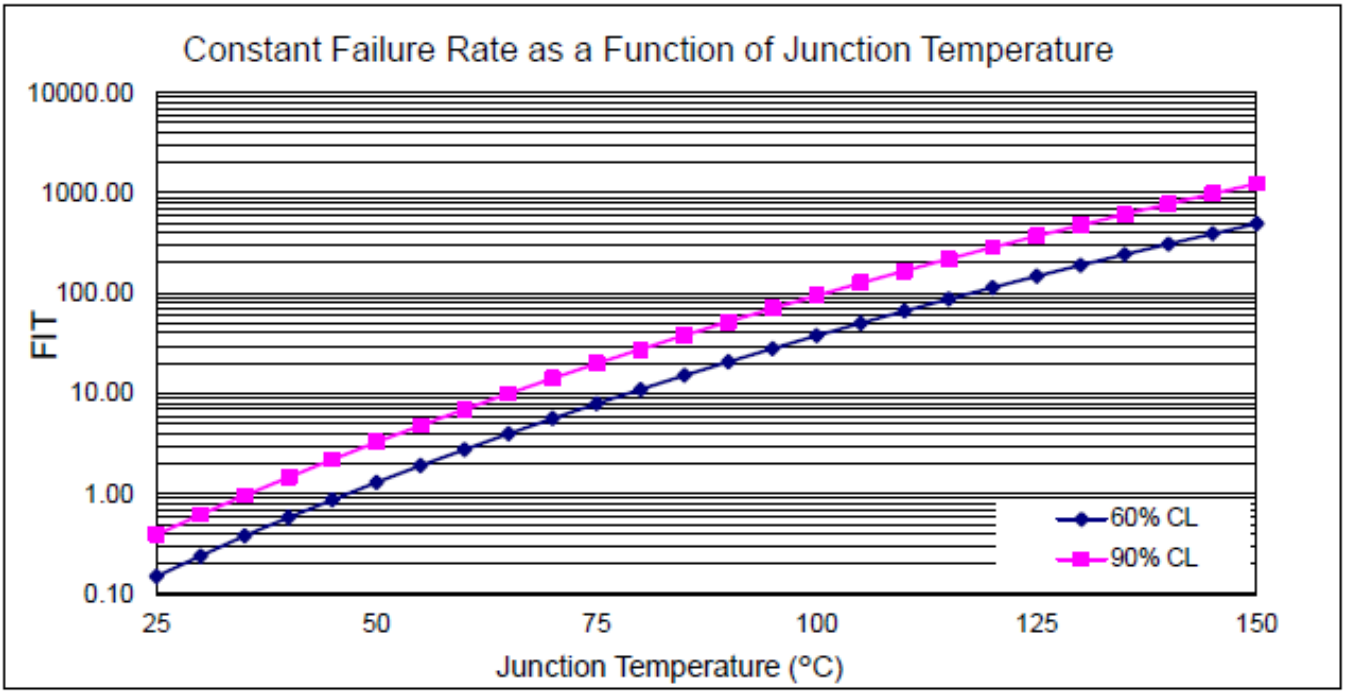
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	3.04E+06	300.9	3.32E+06
Constant (Random)	4.21E+07	21.8	4.59E+07



Digital Step Attenuators (DSA)

Description	:	50Ω and 75Ω Digital Step Attenuators for wireless infrastructure, microwave, test equipment and high reliability space applications.
Products in Family	:	PE430x, PE4320x, PE43404, PE4350x, PE4360x, PE4370x, PE4371x, PE94302, PE431x, 94302-1x
Process Technology	:	UltraCMOS® 2, UltraCMOS® 3.5, UltraCMOS® 5, UltraCMOS® 8
Units Tested	:	4,194

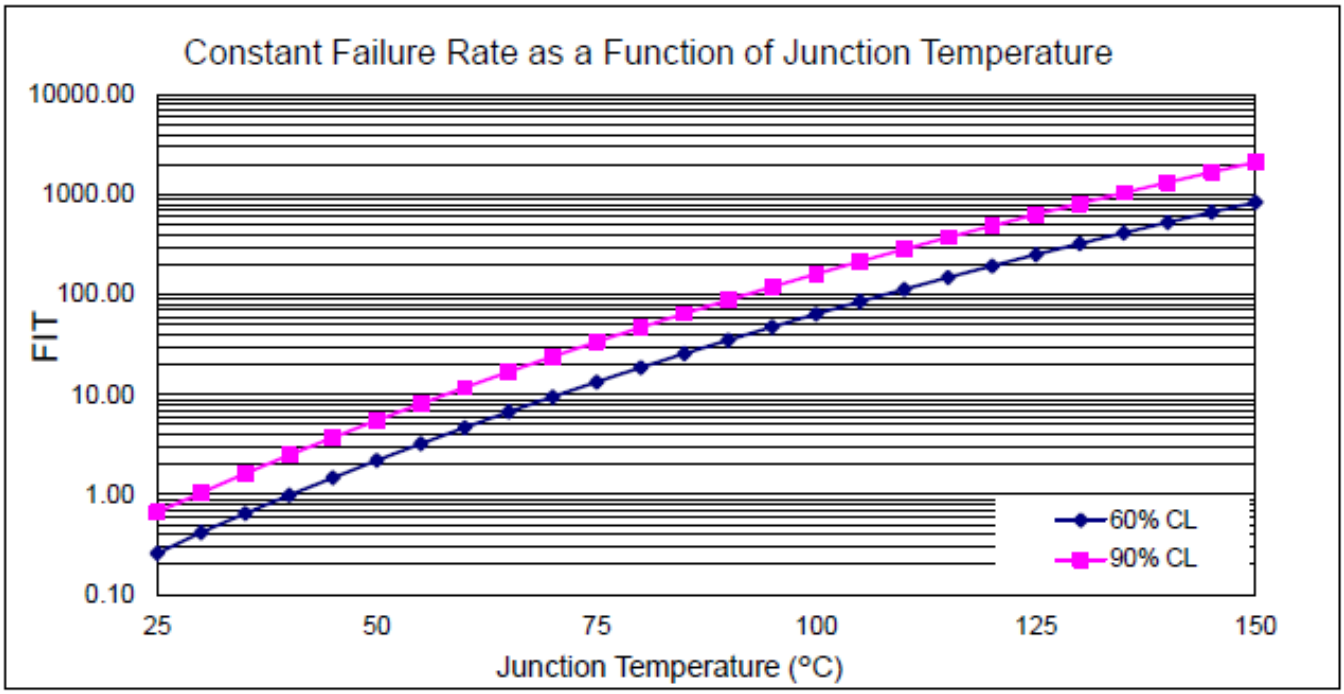
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	4.25E+07	21.5	4.64E+07
Constant (Random)	4.80E+08	1.9	5.24E+08



Digitally Tunable Capacitors (DTC)

Description	:	Supports a wide range of tuning applications, from tuning the center frequency of mobile-TV and antennas, to tunable impedance matching and filters.
Products in Family	:	PE6230x, PE621010, PE621020, PE623060, PE623090, PE6490x, PE6410x, PE613040
Process Technology	:	UltraCMOS® 3.5, UltraCMOS® 5, UltraCMOS® 8
Units Tested	:	2,223

	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	2.76E+07	33.2	3.01E+07
Constant (Random)	2.83E+08	3.2	3.09E+08



GaN Driver Product Family

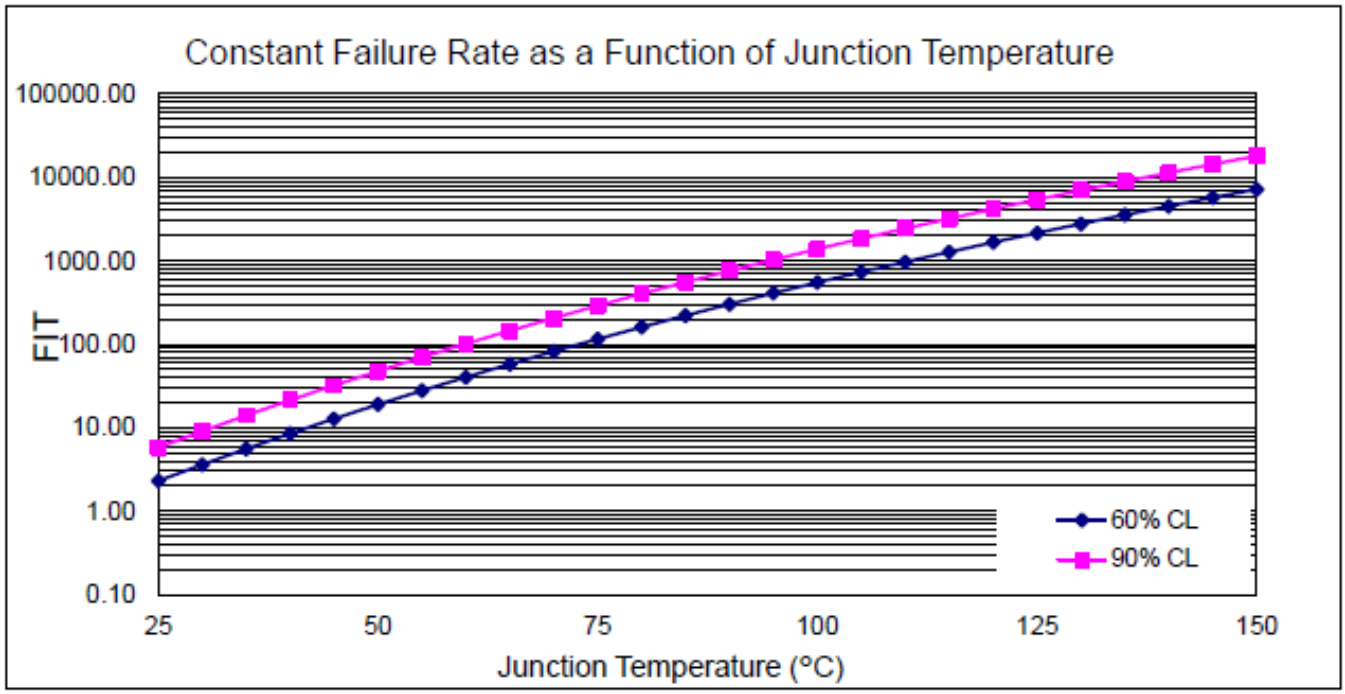
Description : High-speed FET Driver

Products in Family : PE29100

Process Technology : UltraCMOS® 8

Units Tested : 422

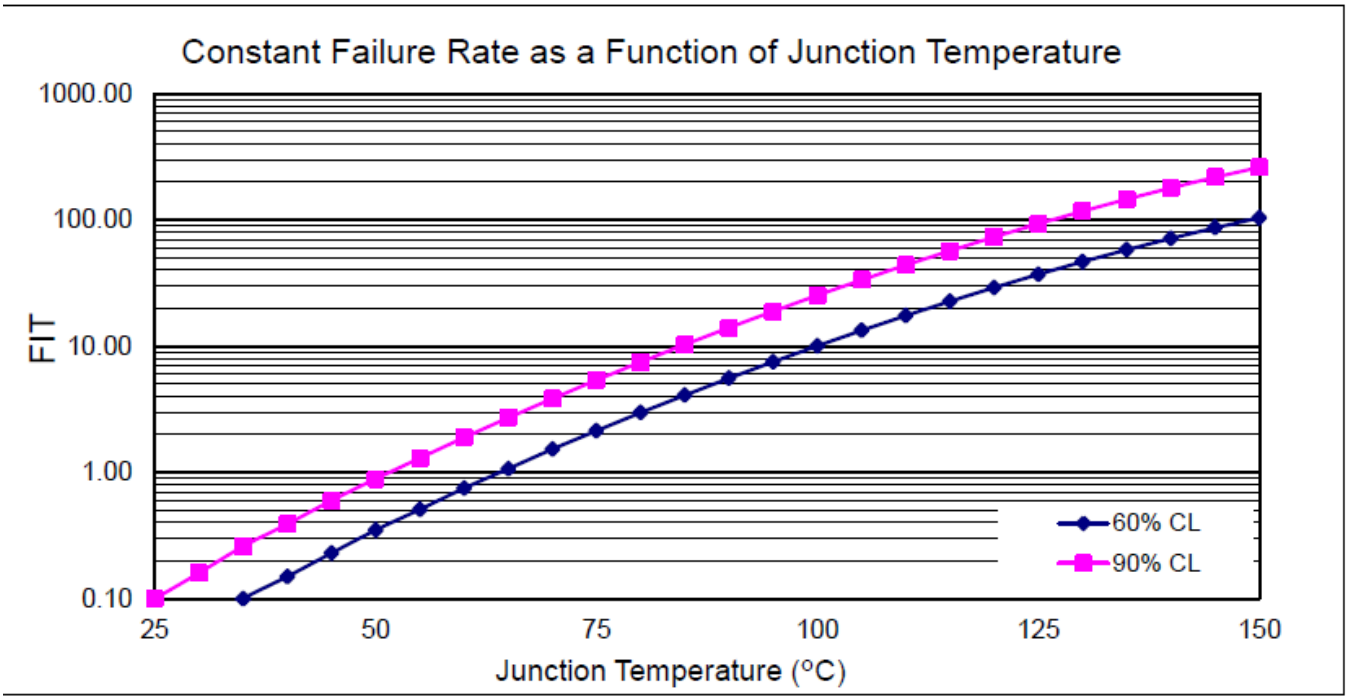
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	1.57E+06	583.4	1.71E+06
Constant (Random)	3.27E+07	28.0	3.57E+07



High Performance Switches (HPSW)

Description	:	High performance switch products for wireless RF, broadband and high reliability space switch applications.
Products in Family	:	PE42020, PE4210, PE4220, PE423422, PE42359, PE423x, PE423422, PE42412, PE4242x, PE4244x, PE4245x, PE424x, PE42512, PE4252x, PE4252x, PE4254x, PE4255x, PE42582, PE426842, PE4272x, PE42742, PE42750, PE427x, PE42820, PE42823, PE42850, PE428x, PE43713, PE43711, PE84140, PE84244, PE9354, PE94257, PE9542x, PE33241, PE425x
Process Technology	:	UltraCMOS® 2, UltraCMOS® 3.5, UltraCMOS® 5, UltraCMOS® 8 UltraCMOS® 11
Units Tested	:	22,769

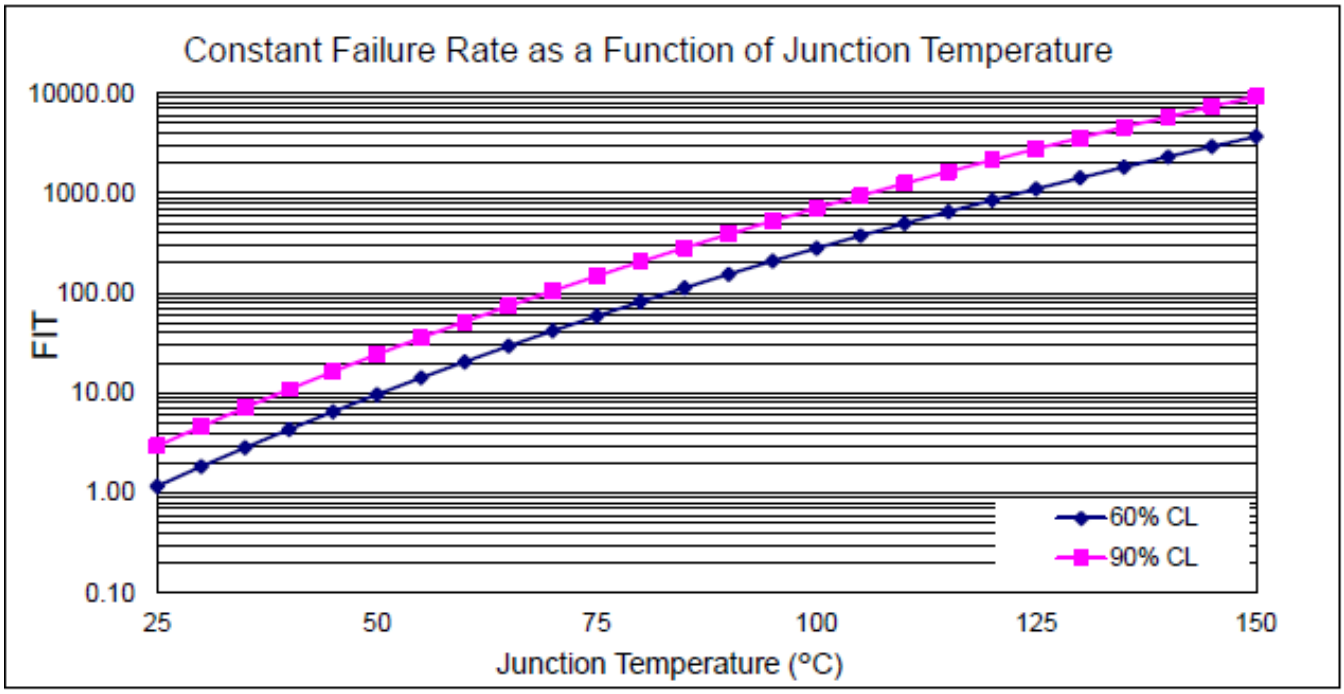
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	2.05E+08	4.5	2.24E+08
Constant (Random)	1.76E+09	0.5	1.96E+09



Power Limiters (LMTR)

Description	:	UltraCMOS Power Limiters.
Products in Family	:	PE45450, PE45140, PE45361
Process Technology	:	UltraCMOS® 5, UltraCMOS® 8
Units Tested	:	512

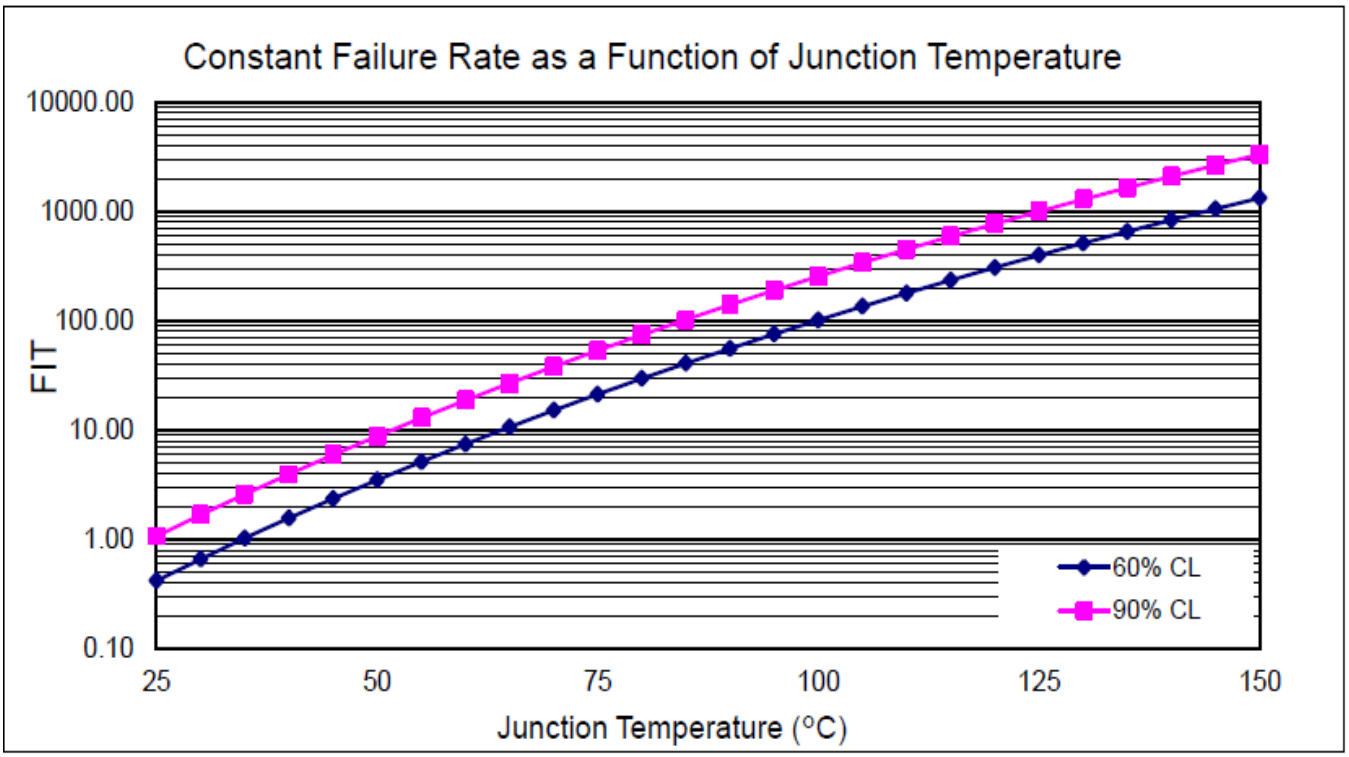
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	6.08E+06	150.7	6.64E+06
Constant (Random)	6.46E+07	14.2	7.05E+07



Monolithic Phase & Amplitude Controller (MPAC)

Description	:	UltraCMOS RF MPACs.
Products in Family	:	PE46120, PE46130, PE46140, PE19601
Process Technology	:	UltraCMOS® 5, UltraCMOS® 8
Units Tested	:	565

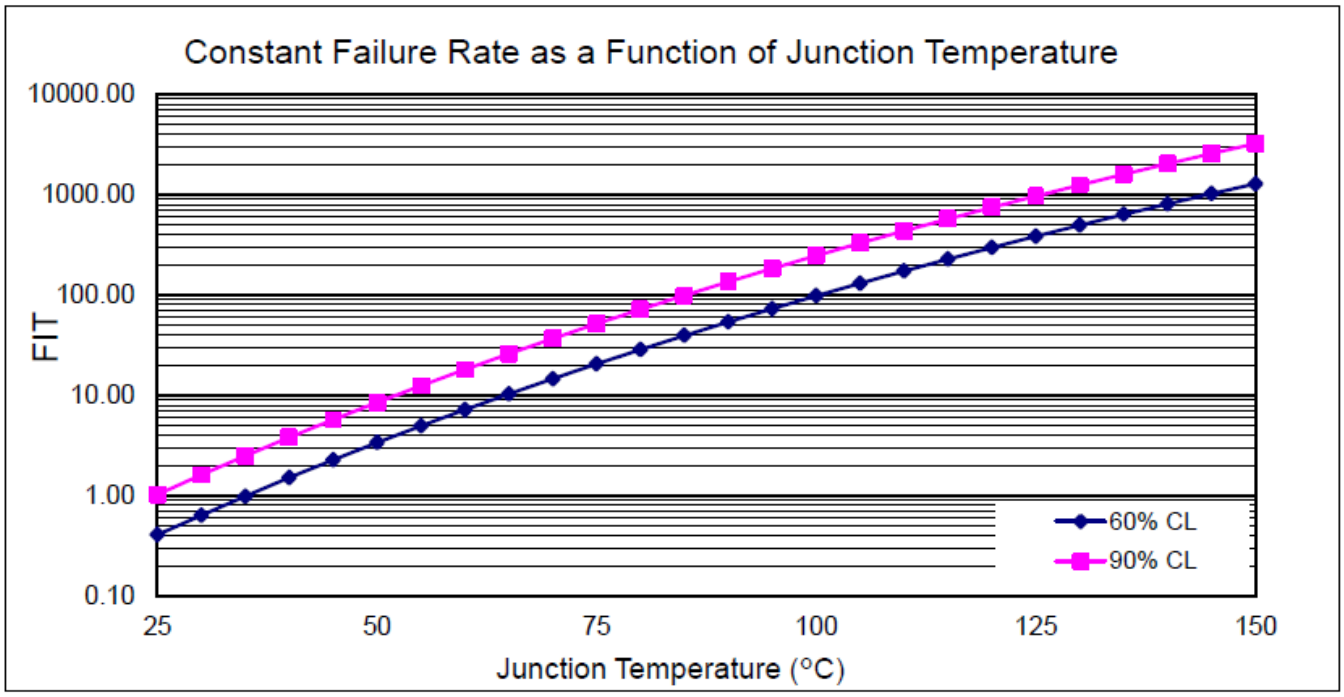
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	7.02E+06	130.6	7.66E+06
Constant (Random)	7.31E+07	12.5	7.98E+07



Mixers (MXR)

Description	:	UltraCMOS MOSFET quad array broadband and tuned mixers.
Products in Family	:	PE412x, PE413x, PE414x, PE4150, PE4151, PE4152, PE41901
Process Technology	:	UltraCMOS® 2, UltraCMOS® 8
Units Tested	:	1, 118

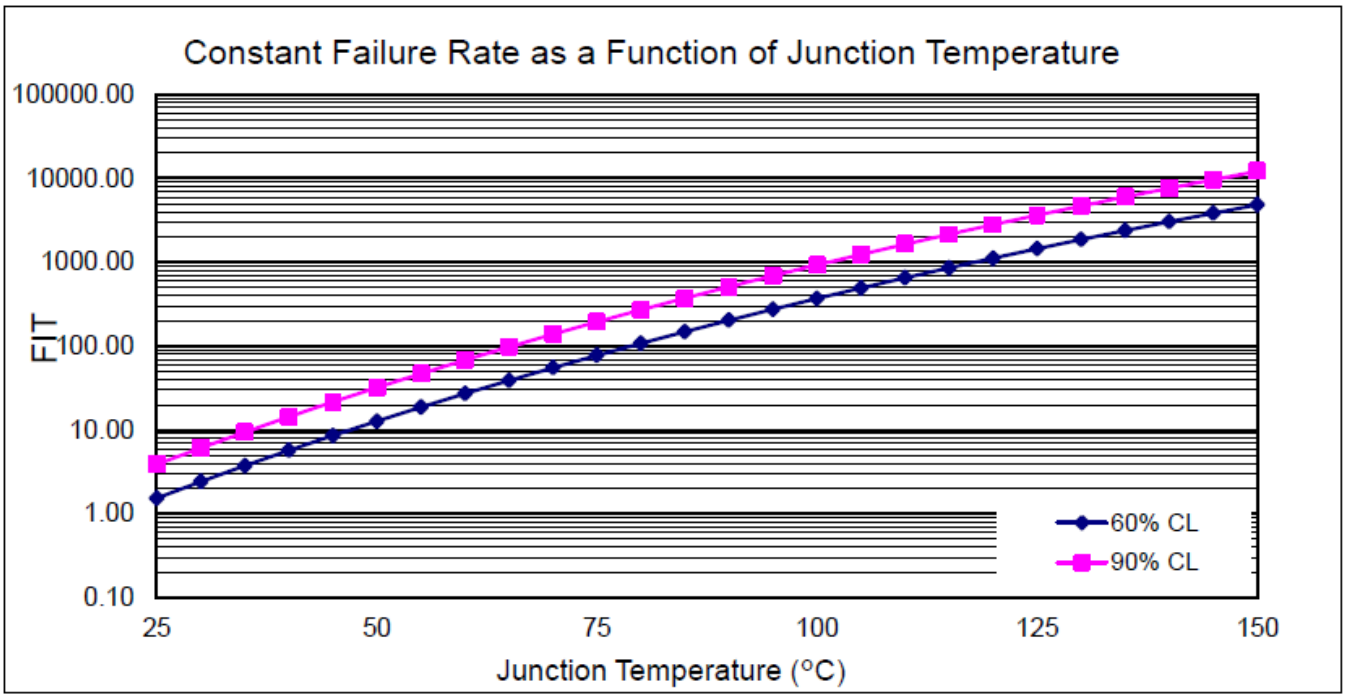
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	9.08E+06	100.9	9.91E+06
Constant (Random)	1.84E+08	5.0	2.01E+08



PA Controller (PAC)

Description	:	PA Controller controls the PA bias current in PAD modules for RF Front Ends
Products in Family	:	PE515131
Process Technology	:	UltraCMOS® 12
Units Tested	:	3, 352

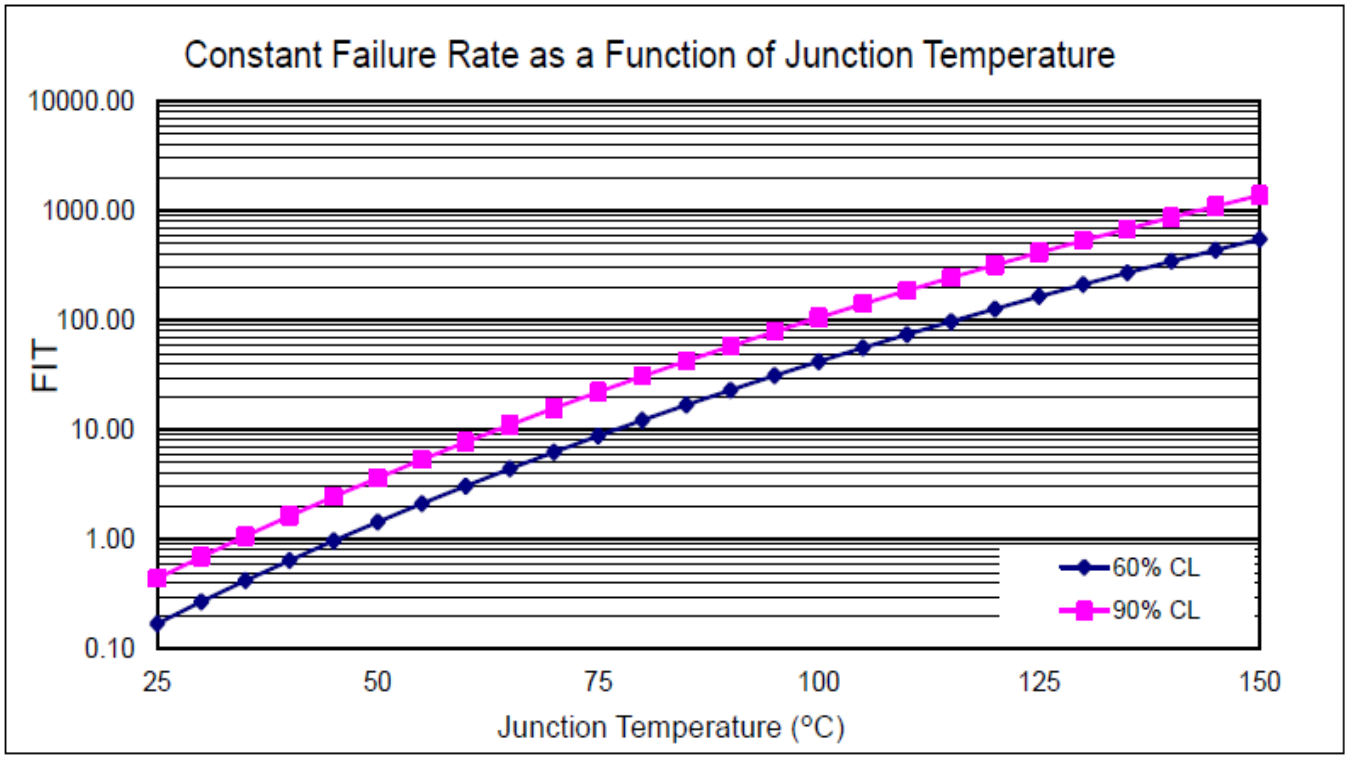
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	1.25E+07	73.4	1.36E+07
Constant (Random)	4.90E+07	18.7	5.35E+07



Phase Locked-Loop Synthesizers (PLL)

Description	:	Integer-N, Fractional-N and Delta Sigma Modulated frequency synthesizers for base station, mobile wireless and high reliability space applications.
Products in Family	:	PE323x, PE3240, PE329x, PE333x, PE334x, PE8334x, PE960x, PE970x, PE9702x, PE972x, PE97240, PE9763, PE97632, PE3324x, PE97640
Process Technology	:	UltraCMOS® 2, UltraCMOS® 5
Units Tested	:	5,968

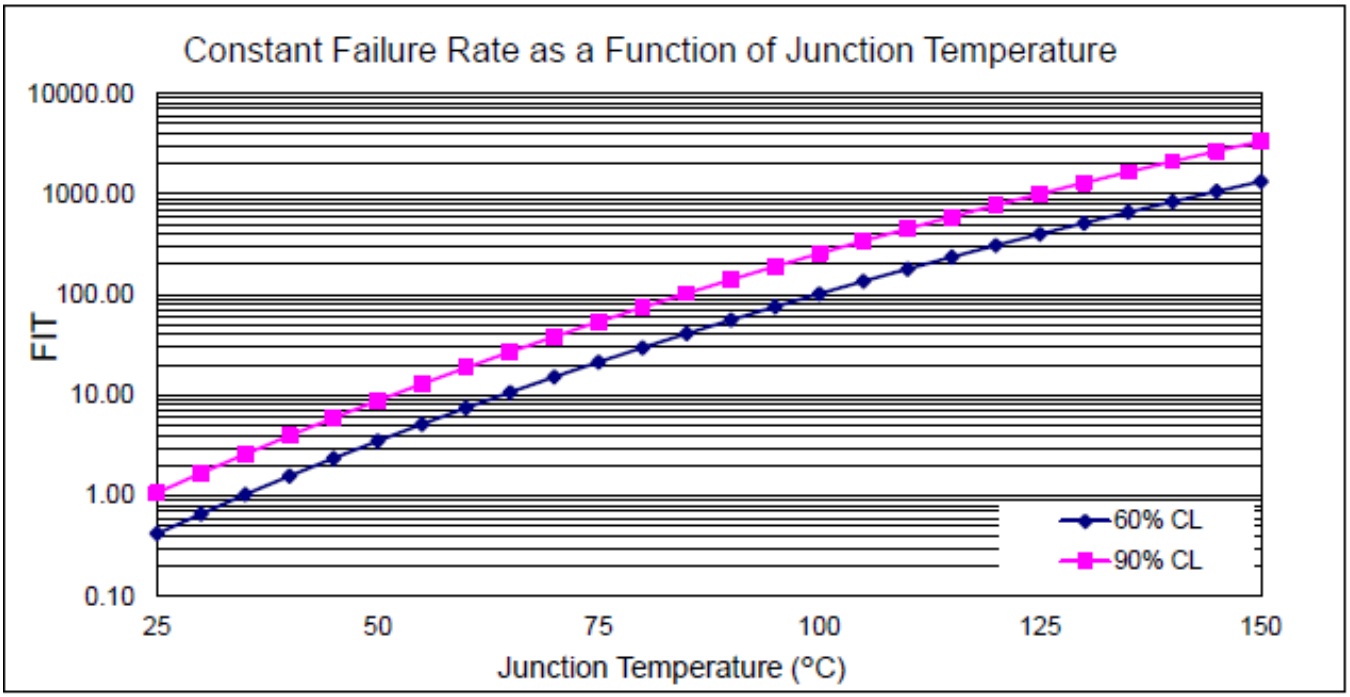
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	3.00E+07	30.5	3.27E+07
Constant (Random)	4.32E+08	2.1	4.72E+08



Phase Shifters (PSH)

Description	:	UltraCMOS RF Phase Shifters.
Products in Family	:	PE44820
Process Technology	:	UltraCMOS® 5
Units Tested	:	351

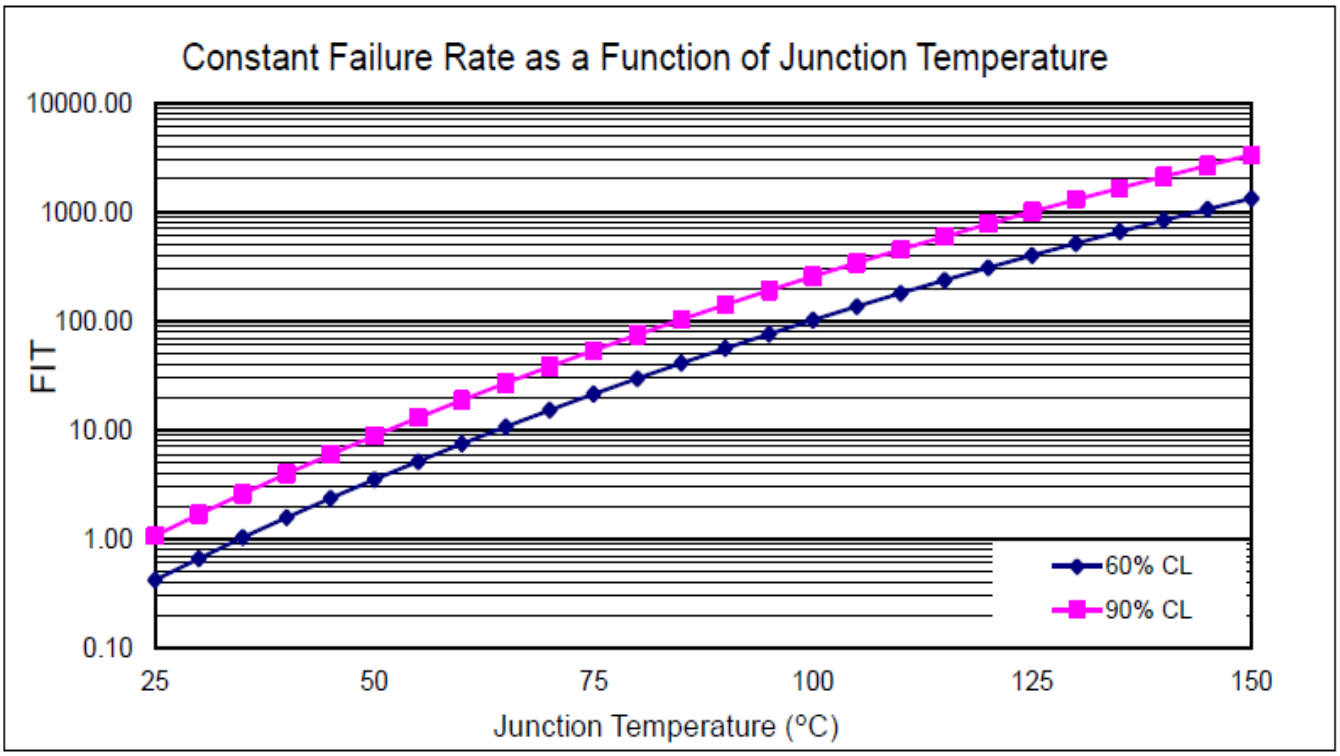
	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	4.36E+06	210.2	4.76E+06
Constant (Random)	4.95E+07	18.5	5.41E+07



Prescalers (PSR)

Description	:	UltraCMOS RF Prescalers.
Products in Family	:	PE350x, PE351x, PE8350x, PE8351x, PE930x, PE931x, PE34500
Process Technology	:	UltraCMOS® 2, UltraCMOS® 3.5, UltraCMOS® 8
Units Tested	:	2,432

	Standard Failure Rate Calculations at 55°C and 60% CL		
	Equivalent Device Hours (EDH)	FITs	MTTF (hours)
Early Life	1.25E+07	73.5	1.36E+07
Constant (Random)	1.78E+08	5.1	1.95E+08



Reliability Data

(Periodic Testing for the last 8 Quarters)

High Temperature Operating Life (HTOL)

Reference Standards : JESD22-A108, MIL-STD-883 M1005.9

Test Conditions : T_A = 125°C (A) or 150°C (B)

: V_{bias} = max operating voltage

Test Duration (typical) : 1,000 hrs. at (A) or 500 hrs. at (B)

	HTOL							
DC HTOL	2016	2016	2016	2017	2017	2017	2017	2018
Process Technology	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
UltraCMOS® 2	0/80	0/45	0/85	0/165	0/165	0/391	0/85	0/85
UltraCMOS® 3.5	0/245	-	0/170	0/85	0/85	0/240	-	-
UltraCMOS® 5	0/370	0/85	0/80	0/240	-	0/319	0/231	-
UltraCMOS® 6	-	-	-	-	-	-	-	-
UltraCMOS® 6.5	0/238	-	-	0/158	-	-	0/255	-
UltraCMOS® 8	0/80	0/80	-	-	0/80	0/337	-	-
UltraCMOS® 10	-	0/538	-	-	-	-	-	-
UltraCMOS® 11	0/1842	-	0/787	0/232	0/77	-	0/77	0/820
UltraCMOS® 12	-	-	0/711	0/60	-	-	0/255	0/3352

	HTOL							
DC HTOL	2016	2016	2016	2017	2017	2017	2017	2018
Product Family	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
ASW	0/801	0/618	0/1011	0/60	0/80	-	0/255	-
Amplifier	n/a	n/a	n/a	n/a	0/77	-	0/77	0/3790
DCDC	-	-	-	-	-	-	-	-
DSA	0/85	-	-	0/78	-	0/80	0/231	-
DTC	-	-	0/80	-	-	0/160	-	-
HPSW	0/1070	0/85	0/496	0/490	0/250	0/710	-	-
LMTR	-	-	-	-	-	-	-	-
MPAC	n/a	n/a	-	-	-	0/85	-	-
MXR	-	-	-	-	-	0/85	0/85	0/85
PAC	-	-	-	-	-	-	-	0/3352
PLL	0/45	0/45	-	-	-	-	-	-
PSH	-	-	-	0/80	-	-	-	-
PSR	-	-	-	-	-	-	-	-

	RFHTOL							
RF HTOL	2016	2016	2016	2017	2017	2017	2017	2018
Process Technology	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
UltraCMOS® 2	-	-	-	-	-	-	-	-
UltraCMOS® 3.5	-	-	-	-	-	0/32	-	-
UltraCMOS® 5	0/32	-	-	-	-	-	-	-
UltraCMOS® 6	-	-	-	-	-	-	-	-
UltraCMOS® 6.5	0/32	-	-	-	-	-	-	-
UltraCMOS® 8	-	-	-	-	0/32	-	-	-
UltraCMOS® 10	-	0/64	-	-	-	-	-	-
UltraCMOS® 11	0/115	-	-	0/63	-	-	-	-
UltraCMOS® 12	n/a	n/a	n/a	n/a	n/a	-	0/32	-

	RFHTOL							
RF HTOL	2016	2016	2016	2017	2017	2017	2017	2018
Product Family	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
ASW	0/64	0/64	0/128	-	-	-	0/32	-
Amplifier	n/a	n/a	n/a	n/a	-	-	-	-
DCDC	-	-	-	-	-	-	-	-
DSA	0/32	-	-	-	-	-	-	-
DTC	-	-	-	-	-	0/32	-	-
HPSW	0/31	-	-	-	0/32	-	-	-
PSH	-	-	-	-	-	-	-	-

Temperature Cycle (TC)

Reference Standards : JESD22-A104

Test Conditions : -55°C to +125°C (B)

: -65°C to +150°C (C)

Test Duration (typical) : 1,000 cyc. at (B) or 500 cyc. at (C)

	TC							
TC	2016	2016	2016	2017	2017	2017	2017	2018
Package Family	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
8L 1.5x1.5 UDFN	-	-	-	-	-	-	-	-
10L 2x2 FCETSLP	-	-	-	-	-	-	-	-
10L 2x2 QFN	-	-	-	-	-	0/55	-	-
12L 2x2 QFN	0/120	-	0/55	0/55	0/55	-	-	-
12L 3x3 QFN	-	-	-	-	-	0/135	-	-
16L 3x3 QFN	-	-	-	-	0/220	-	-	-
6L SC70	0/55	-	0/55	0/55	0/55	-	-	-
20L 4x4 QFN	-	-	-	-	-	0/250	-	-
24L 4x4 QFN	0/396	-	0/165	-	-	0/215	-	-
32L 5x5 QFN	0/396	-	0/165	0/55	-	-	0/135	-
24L 4x4 QFN FCOLAM	-	-	-	0/520	0/145	0/275	-	-
32L 5x5 QFN FCOLAM	0/165	-	-	-	-	0/50	-	-
8L TSSOP	-	-	-	-	-	-	-	-
32L 5x5 QFN	0/396	-	0/165	0/55	-	-	0/135	-
44L CQFP	-	-	-	-	-	-	-	-

Note

n/a - Reliability data not available. Package (family) not yet qualified at the specified period.

dash (-) - Test not performed at the specified period.

* Plastic encapsulated packages had undergone MSL Preconditioning prior to test.

Highly Accelerated Stress Test (HAST)

Reference Standards : JESD22-A110

Test Conditions : 130°C, 85% RH, 2.27 atm. (A)

: 110°C, 85% RH, 1.20 atm. (B)

Test Duration (typical) : 96 hrs. at (A) or 264 hrs. at (B)

	HAST							
HAST	2016	2016	2016	2017	2017	2017	2017	2018
Package Family	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
8L 1.5x1.5 UDFN	-	-	-	-	-	-	-	-
10L 2x2 FCETSLP	-	-	-	-	-	-	-	-
10L 2x2 QFN	-	-	-	-	-	0/55	-	-
12L 2x2 QFN	0/50	-	-	0/55	-	-	-	-
12L 3x3 QFN	-	-	-	-	-	0/45	-	-
16L 3x3 QFN	-	-	-	-	0/55	-	-	-
6L SC70	0/55	-	0/55	0/55	-	-	-	-
20L 4x4 QFN	-	-	-	-	-	0/190	-	-
24L 4x4 QFN	0/396	-	-	-	-	-	-	-
32L 5x5 QFN	0/381	-	0/165	-	-	-	0/285	-
24L 4x4 QFN FCOLAM	-	-	0/160	-	0/54	0/165	-	-
32L 5x5 QFN FCOLAM	0/150	-	-	-	-	-	-	-
8L TSSOP	-	-	-	-	-	-	-	-
32L 5x5 QFN	0/381	-	0/165	-	-	-	0/285	-
44L CQFP	-	-	-	-	-	-	-	-

Note

n/a - Reliability data not available. Package (family) not yet qualified at the specified period.

dash (-) - Test not performed at the specified period. HAST may not apply to hermetic packages.

* Plastic encapsulated packages had undergone MSL Preconditioning prior to test.

High Temperature Storage (HTS)

Reference Standards : JESD22-A103

Test Conditions : Ta = 150°C

Test Duration (typical) : 1,000 hrs.

	HTS							
HTS	2016	2016	2016	2017	2017	2017	2017	2018
Package Family	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
8L 1.5x1.5 UDFN	-	-	-	-	-	-	-	-
10L 2x2 FCETSLP	-	-	-	-	-	-	-	-
10L 2x2 QFN	-	-	-	-	-	0/85	-	-
12L 2x2 QFN	0/180	-	0/55	0/85	-	-	-	-
12L 3x3 QFN	-	-	-	-	-	-	-	-
16L 3x3 QFN	-	-	-	-	0/80	-	-	-
6L SC70	0/79	-	0/85	0/85	-	-	-	-
20L 4x4 QFN	-	-	-	-	-	0/391	-	-
20L 4x4 QFN	-	-	-	-	-	0/391	-	-
32L 5x5 QFN	-	-	0/83	0/80	-	-	0/231	-
24L 4x4 QFN FCOLAM	-	-	-	0/559	0/170	0/430	-	-
32L 5x5 QFN FCOLAM	0/270	-	-	-	-	0/80	-	-
8L TSSOP	-	-	-	-	-	-	-	-
32L 5x5 QFN	-	-	0/83	0/80	-	-	0/231	-

Note

n/a - Reliability data not available. Package (family) not yet qualified at the specified period.

dash (-) - Test not performed at the specified period.