Peregrine Semiconductor

QUARTERLY RELIABILITY REPORT

July, 2009

Document Number 03-0021, revision 01

Table of Contents

Peregrine Semiconductor Reliability System

The quarterly reliability report is a compilation of reliability stress test results that crosses the entire product 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 **9,629 devices** have been tested in HTOL with a total of **1.25E+9 equivalent device hours**. The overall failure rate for the PSC family of products is **0.73 FIT at 55°C and 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. Resulting data collected from HTOL tests is derated (accelerated) to a typical operating temperature of 55°C.

Peregrine Semiconductor conducts an ongoing product reliability monitoring program to evaluate sample products from high volume, major product families on an annual basis. The reliaiblity 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 laboratory located in San Jose, California. Regular auditing of the laboratory is performed to ensure compliance to ISO standards.

Failure Rate Calculation

Acceleration Factor

An acceleration factor is a constant, which expresses the enhanced effect of temperature on a device's failure rate used in reliability prediction formulas. The typical purpose is to show the acceleration effect between the failure rates at two different temperatures. The semiconductor industry uses the thermal acceleration factor formula based on Arrhenius equation noted below:

$$\textbf{Acceleration Factor}(\lambda) = e^{Ea/k\,(1/T_1 - 1/T_2)}$$

where: e = base of the natural logarithm
Ea = activation energy
k = Boltzmann's constant
T_1 = actual temperature in Kelvin
T_2 = test temperature in Kelvin

$T_{1\,=}$ $55^{o}C + 273.15 = 328.15\ ^{o}K$
$T_{2(125)\,=}$ $125^{o}C + 273.1 = 398.15\ ^{o}K$
$A_{F(125)} = e\,[0.7 / (8.617 \times 10^{-5}) \times (1/328.15 - 1/398.15)] =$ 77.6 @125°C
$T_{2(150)\,=}$ $150^{o}C + 273.1 = 423.15\ ^{o}K$
$A_{F(150)} = e\,[0.7 / (8.617 \times 10^{-5}) \times (1/328.15 - 1/423.15)] =$ 259.2 @150°C

Failure Rate 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 (10^9) 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:

$$\textbf{FIT}\ (\lambda) = \{[\chi^2(2r+2)]\ /(2 \times EDH)\} \times 1.0E+9$$

where: χ^2 = chi square function
r = number of failures
EDH = equivalent device hours (number of units x test hours x Acceleration Factor)

Sample Calculation

Given: 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 = 15.3 6.53E+7

Reliability Results

New data is identified by italics.

Antenna Switch Group 1

Product Family: ASM1
Products in Family[1]: PE4261, PE42610, PE42612, PE4263, PE42630, PE42631, PE4268, PE4269
Fab Process[2]: FD/FA (PE4261, PE42610)

Early Life Failure Rate Calculation[3]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
3.75E+6	244.3	4.09 E+6

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
6.28E+7	14.6	6.85E+7

High Temperature Operating Life Data[4]

Device	Package	Date	Test Temp	Duration (hours)	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
4263	Flip Chip	Sep-04	125°C	1000	141	0	5.25E+5	1.09E+7	QND040401
4263	Flip Chip	Sep-04	150°C	1000	141	0	1.75E+6	3.65E+7	QND040401
4261	Flip Chip	Jul-05	150°C	500	118	0	1.47E+6	1.53E+7	QNP041102
				Total	**400**	**0**	**3.75E+6**	**6.28E+07**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. FA & FD process identical except for additional metal three layer in FA used for routing on flip chip products.
3. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
4. HTOL performed per Mil-Std 883 M1015D.

Antenna Switch Group 2

Product Family: ASM2
Products in Family[1]: PE42110, PE42551, PE42552, PE42632, PE42641, PE42660, PE42670, PE42671, PE42672, PE42674, PE42681, PE42693
Fab Process[2]: FD/FA

Early Life Failure Rate Calculation[3]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
8.51E+06	107.7	9.29E+06

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
8.86E+07	10.3	9.67E+07

High Temperature Operating Life Data[4]

Device	Package	Date	Test Temp	Duration (hours)	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
42660	Flip Chip	Dec-05	150°C	500	120	0	1.49E+6	1.56E+7	QND050901
42672	20L 4x4 MLP	Dec-06	150°C	500	115	0	1.43E+6	1.49E+7	QNP06003
42641	16L 3x3 QFN	Apr-07	150°C	500	148	0	1.84E+6	1.92E+7	QNP06012
42641	16L 3x3 QFN	Aug-08	150°C	500	224	0	2.79E+6	2.90E+7	QNP08008
42641	*16L 3x3 QFN*	*Apr-09*	*150*	*500*	*77*	*0*	*9.58E+5*	*9.98E+6*	*Q09024*
				Total	**684**	**0**	**8.51E+6**	**8.86E+7**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. FA (KA) & FD (KD) process identical except for additional metal three layer in FA used for routing on flip chip products. FA/FD process manufactured at the Sapphicon foundry, KA/KD process are identical to FA/FD but manufactured at OKI Miyazaki foundry.
3. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
4. HTOL performed per Mil-Std 883 M1015D.

Antenna Switch Group 3

Product Family: ASM3
Products in Family[1]: PE42112. PE42113, PE42691, PE42692, PE42694
Fab Process[2]: GA/GD

Early Life Failure Rate Calculation[3]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
9.02E+06	101.6	9.84E+06

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
9.39E+07	9.8	1.03E+08

High Temperature Operating Life Data[4]

Device	Package	Date	Test Temp	Duration	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
MC9.2	20L 4x4 QFN	Feb-08	150	500	116	0	1.44E+6	1.50E+7	1.44E+6
42691	20L 4x4 QFN	May-08	150	500	148	0	1.84E+6	1.92E+7	1.84E+6
42691	20L 4x4 QFN	Sep-08	150	500	230	0	2.86E+6	2.98E+7	2.86E+6
42691	20L 4x4 QFN	Mar-09	150	500	231	0	2.87E+6	2.99E+7	2.87E+6
				Total	**725**	**0**	**9.02E+6**	**9.39E+7**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. GA (LA) & GD (LD) processes are identical except for the additional metal three layer used in the GA\LA process for routing on flip chip products. GA/GD is process manufactured at the Sapphicon foundry. The LA/LD process is equivalent to GA/GD but manufactured at the OKI Miyazaki foundry.
3. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
4. HTOL performed per Mil-Std 883 M1015D.

Antenna Switch Group 4

Product Family: ASM4
Products in Family[1]: PE42510, PE42650
Fab Process[2]: FA/FD

Early Life Failure Rate Calculation[3]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
5.75E+06	159.4	6.27E+06

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
5.99E+07	15.3	6.53E+07

High Temperature Operating Life Data[4]

Device	Package	Date	Test Temp	Duration	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
42510	32L 5x5 QFN	Jun-08	150	500	231	0	2.87E+6	2.99E+7	Q08005
42650	32L 5x5 QFN	Oct-08	150	500	231	0	2.87E+6	2.99E+7	Q08006
				Total	**462**	**0**	**5.75E+6**	**5.99E+7**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. FA & FD process identical except for additional metal three layer in FA used for routing on flip chip products.
3. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
4. HTOL performed per Mil-Std 883 M1015D.

Digital Step Attenuator Group

Product Family: DSA
Products in Family[1]: PE4302, PE4303, PE4304, PE4305, PE4306, PE4307, PE4309, PE43204, PE43701, PE43703
Fab Process: FC

Early Life Failure Rate Calculation[2]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
5.44E+06	168.4	5.94E+06

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
7.75E+07	11.8	8.46E+07

High Temperature Operating Life Data[3]

Device	Package	Date	Test Temp	Duration (hours)	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
4302	20L 4x4 MLP	May-04	125°C	2000	117	0	4.36E+5	1.82E+7	QNP040102
4302	20L 4x4 MLP	Jun-05	125°C	1000	119	0	4.43E+5	9.24E+6	QNP041106
94302	28L QFP	Jul-06	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
4309	20L 4x4 MLP	Jun-07	150°C	500	116	0	1.44E+6	1.50E+7	QND06016
94302	28L QFP	Dec-07	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
43703	32L 5x5 QFN	Nov-08	150°C	500	231	0	2.87E+6	2.99E+7	Q08007
94302	28L QFP	Nov-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
				Total	**649**	**0**	**5.44E+6**	**7.75E+7**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
3. HTOL performed per Mil-Std 883 M1015D.

Mixer Group

Product Family: MXR
Products in Family[1]: PE4120, PE4122, PE4124, PE4125, PE4126, PE4134, PE4135, PE4140, PE4150, PE84140
Fab Process: FA, FA-NL, FC

Early Life Failure Rate Calculation[2]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
2.06E+06	445.2	2.25E+06

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
7.02E+07	13.1	7.66E+07

High Temperature Operating Life Data[3]

Device	Package	Date	Test Temp	Duration (hours)	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
4120	6L 3x3 MLP	Jun-01	125°C	1000	80	0	2.98E+5	6.21E+6	MXR1 Qual 1
4122	8L TSSOP	Oct-01	125°C	2000	116	0	4.32E+5	1.80E+7	MXR2 Qual 1
4122	8L TSSOP	Nov-01	125°C	2000	116	0	4.32E+5	1.80E+7	MXR2 Qual 2
4126	8L TSSOP	May-03	125°C	2000	120	0	4.47E+5	1.86E+7	MXR2 Qual 3
4134	6L 3x3 MLP	Aug-04	125°C	1000	120	0	4.47E+5	9.32E+6	QNP031204
				Total	**552**	**0**	**2.06E+6**	**7.02E+7**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
3. HTOL performed per Mil-Std 883 M1015D.

Phase Locked Loop Group

Product Family: PLL
Products in Family[1]: PE3236, PE3238, PE3239, PE3240, PE3291, PE3293, PE3335, PE3336, PE3339, PE3340, PE3341, PE3342, PE9600, PE9601, PE9701, PE9702, PE9704, PE9721, PE9722, PE9763, PE83335, PE83336, PE83337, PE83339, PE83340, PE83341, PE83342
Fab Process: FA/FN

Early Life Failure Rate Calculation[2]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
1.22E+07	75.3	1.33E+07

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
2.86E+08	3.2	3.13E+08

(HTOL Data on following page)

High Temperature Operating Life Data[3]

Device	Package	Date	Test Temp	Duration (hours)	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
3335	44L PLCC	Oct-01	125°C	2000	116	0	4.32E+5	1.80E+7	QRM010501
3236	44L PLCC	Nov-01	125°C	5000	115	0	4.29E+5	4.46E+7	PLL1 Qual 1
3236	44L PLCC	May-02	125°C	1000	179	0	6.67E+5	1.39E+7	PLL1 Qual 2
3335	48L 7x7 MLP	Jul-02	125°C	2000	116	0	4.32E+5	1.80E+7	QNP020801
3342	20L TSSOP	Dec-02	125°C	2000	120	0	4.47E+5	1.86E+7	QND020802
9601	44 CQFJ	May-03	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9701	44 CQFJ	Jun-03	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9601	44 CQFJ	Aug-03	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9704	44 CQFJ	Sep-03	125°C	1122	22	0	8.20E+4	1.92E+6	QCI Qual
3342	20L 4x4 MLP	Sep-03	125°C	2000	180	0	6.71E+5	2.80E+7	QNP030401
3336	44L PLCC	Sep-03	125°C	2000	180	0	6.71E+5	2.80E+7	QEXP030301
9702	44 CQFJ	Apr-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
83336	44 CQFJ	Jul-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9601	44 CQFJ	Dec-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9702	44 CQFJ	Dec-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
3341	20L 4x4 MLP	Jan-05	125°C	1000	120	0	4.47E+5	9.32E+6	QNP040601
9763	68 CQFJ	Jan-05	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
83336	44 CQFJ	Mar-05	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9601	44 CQFJ	Apr-05	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
83336	44 CQFJ	May-05	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9704	44 CQFJ	Nov-05	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9704	44 CQFJ	Jun-06	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
83336	44 CQFJ	Jul-06	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
83336	44 CQFJ	Nov-06	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9702	44 CQFJ	Apr-07	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
97632	68 CQFJ	May-07	125°C	2000	22	0	8.20E+4	3.42E+6	QCI Qual
9701	44 CQFJ	May-07	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9702	44 CQFJ	Oct-07	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9702	44 CQFJ	Dec-07	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9763	68 CQFJ	May-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
3341	20L TSSOP	Jun-08	150°C	500	116	0	1.44E+6	1.50E+7	QNP07007
9702	44 CQFJ	Jun-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9701	44 CQFJ	Jul-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9763	68 CQFJ	Jul-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
97022	44 CQFJ	Sep-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
97042	44 CQFJ	Oct-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
3336	48L 7x7 MLP	Nov-08	150°C	500	116	0	1.44E+6	1.50E+7	QNP07008
3341	*24L TSSOP*	*Jun-08*	*150*	*500*	*231*	*0*	*2.87E+6*	*2.99E+7*	*QNP07007*
				Total	**2183**	**0**	**1.22E+7**	**2.86E+8**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
3. HTOL performed per Mil-Std 883 M1015D.

Prescalers Group

Product Family: PSR
Products in Family[1]: PE3501, PE3502, PE3503, PE3511, PE3512, PE3513, PE83501, PE83502, PE83503, PE83511, PE83512, PE83513, PE9301, PE9302, PE9303, PE9304, PE9308, PE9311, PE9312, PE9313
Fab Process: FA/FN/GC

Early Life Failure Rate Calculation[2]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
3.06E+06	299.9	3.33E+06

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
9.82E+07	9.3	1.07E+08

High Temperature Operating Life Data[3]

Device	Package	Date	Test Temp	Duration (hours)	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
3511	6L SC70	Nov-02	125°C	2000	119	0	4.43E+5	1.85E+7	PSR2 Qual 1
9301	8L CSOIC	May-03	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9301	8L CSOIC	Dec-03	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9301	8L CSOIC	Jan-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9313	8L CSOIC	Mar-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9303	8 CFPG	Apr-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9311	8L CSOIC	May-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
3512	6L SC70	Oct-04	125°C	2000	165	0	6.15E+5	2.56E+7	PSR2 Qual 2
3503	8L MSOP	Nov-04	125°C	2000	161	0	6.00E+5	2.50E+7	PSR1 Qual 1
9304	8 CFPG	Mar-05	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
83512	8 CFPG	Jul-05	125°C	1000	45	0	1.68E+5	3.49E+6	QCI Qual
9303	8 CFPG	Jan-06	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9312	8 CFPG	Mar-06	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9311	8 CFPG	Jul-06	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9312	8 CFPG	Mar-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9311	8 CFPG	Apr-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9308	8 CFPG	Aug-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9308	8 CFPG	Sep-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
9304	8 CFPG	Oct-08	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
				Total	**820**	**0**	**3.06E+6**	**9.82E+7**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
3. HTOL performed per Mil-Std 883 M1015D.

Switch Group 2

Product Family: SW2
Products in Family[1]: PE4210, PE4220, PE4230, PE4231, PE4232, PE4235, PE4237, PE4239, PE4240, PE4241, PE4242, PE4243, PE4244, PE4245, PE4246, PE4248, PE4249, PE9354
Fab Process: Peregrine's 0.5um SPDM & SPTM UTSi Process

Early Life Failure Rate Calculation[2]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
1.17E+07	78.3	1.28E+07

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
2.82E+08	3.3	3.07E+08

High Temperature Operating Life Data[3]

Device	Package	Date	Test Temp	Duration (hours)	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
4210	8L MSOP	Jun-01	125°C	2000	116	0	4.32E+5	1.80E+7	QNP010401
4230	8L MSOP	Oct-01	125°C	2000	116	0	4.32E+5	1.80E+7	SW1 Qual 1
4230	8L MSOP	Mar-02	125°C	1000	116	0	4.32E+5	9.01E+6	SW1 Qual 2
4235	8L MSOP	Apr-02	125°C	2000	116	0	4.32E+5	1.80E+7	QNP011201
4232	6L 3x3 MLP	Aug-02	125°C	2000	120	0	4.47E+5	1.86E+7	SW1 Qual 5
4244	6L 3x3 MLP	Nov-02	125°C	2000	120	0	4.47E+5	1.86E+7	SW2 Qual 1
4241	6L SOT 23	Apr-03	125°C	2000	120	0	4.47E+5	1.86E+7	SW2 Qual 2
4230	8L MSOP	Aug-03	125°C	2000	239	0	8.91E+5	3.71E+7	SW1 Qual 3
4230	8L MSOP	Apr-04	125°C	2000	118	0	4.40E+5	1.83E+7	SW1 Qual 4
4210	8L MSOP	Oct-04	150°C	1000	117	0	1.46E+6	3.03E+7	QRM040602
9354	8L CSOIC	Mar-05	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
4231	8L MSOP	Jun-05	125°C	1000	120	0	4.47E+5	9.32E+6	QNP041101
4231	8L MSOP	Jun-05	125°C	1000	120	0	4.47E+5	9.32E+6	QNP041105
4239	6L SC70	Oct-05	125°C	1000	149	0	5.55E+5	1.16E+7	QNP041103
4230	8L MSOP	Sep-06	150°C	500	115	0	1.43E+6	1.49E+7	SW1 Qual 6
4237	6L 3x3 DFN	Apr-08	150°C	500	231	0	2.87E+6	2.99E+7	QNP07004
				Total	**2055**	**0**	**1.17E+7**	**2.81E+8**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
3. HTOL performed per Mil-Std 883 M1015D.

Switch Group 3

Product Family: SW3
Products in Family[1]: PE4250, PE4251, PE4255, PE4256, PE4257, PE4259, PE4270, PE4271, PE4272, PE4273, PE4274, PE42742, PE4280, PE4283, PE94257
Fab Process: FD

Early Life Failure Rate Calculation[2]

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
8.80E+06	104.1	9.61E+06

Constant (Random) Failure Rate Calculation

Equivalent Device Hours (EDH)	FITs @ 55°C	MTTF @ 55°C
	60% Confidence Level	60% Confidence Level
1.32E+08	7.0	1.44E+08

High Temperature Operating Life Data[3]

Device	Package	Date	Test Temp	Duration (hours)	Sample Size	# of Failures	ELFR EDH	Total EDH	Test Ref. #
4256	20L 4x4 MLP	Sep-03	125°C	2000	117	0	4.36E+5	1.82E+7	SW3 Qual 1
84140	8 CFPG	Jan-04	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
94257	8L CSOIC	Apr-04	125°C	1078	22	0	8.20E+4	1.84E+6	QCI Qual
4259	6L SC70	Apr-04	125°C	2000	119	0	4.43E+5	1.85E+7	SW3 Qual 2
4259	6L SC70	Nov-04	125°C	1000	119	0	4.43E+5	9.24E+6	QNP040702
84244	8 CFPG	Feb-05	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
4256	20L 4x4 MLP	Dec-05	125°C	1000	116	0	4.32E+5	9.01E+6	QLS050801
94257	16 CFP	Apr-06	125°C	1000	22	0	8.20E+4	1.71E+6	QCI Qual
42742	20L 4x4 MLP	Sep-06	150°C	500	116	0	1.44E+6	1.50E+7	QNP060601
4257	20L 4x4 MLP	Oct-06	150°C	500	116	0	1.44E+6	1.50E+7	SW3 Qual 3
4259	6L SC70	Sep-08	150°C	500	231	0	2.87E+6	2.99E+7	Q08018
42742	*20L 4x4 QFN*	*Apr-09*	*150*	*500*	*77*	*0*	*9.58E+5*	*9.98E+6*	*Q09010*
				Total	**1099**	**0**	**8.80E+6**	**1.32E+8**	

Notes:

1. Products grouped by functionality, design architecture and application.
2. Early Life Failure Rate calculation is derived from HTOL performance at 48 hours.
3. HTOL performed per Mil-Std 883 M1015D.

ESD Results

Human Body Model

Part #	Date	Sample Size	Verified Capability (Volts)	Datasheet Specification (Volts)	Notes	Report #
PE3502	Aug-09	3	500	250		112-0013
PE3238	Jun-09	3	1000	1000		112-0001
PE43204	May-09	10	2000	2000		112-0227
PE42691	May-09	10	1500	1500		05-0111
PE42641	Apr-09	10	2000	2000	Antenna: 4000V	112-0230
PE42742	Mar-09	10	3500	3500	RF pins only	112-0229
PE43204	Feb-09	10	2000	2000		112-0219
PE4259	Nov-08	10	2500	2000		112-0210
PE3336	Nov-08	9	1000	1000		05-0041
PE43703	Oct-08	10	500	500		112-0209
PE42552	Oct-08	10	1000	1000		112-0207
PE42692/PE42694	Oct-08	11	500	500	All pins	112-0221
PE42692/PE42694	Oct-08	10	1000	1000	Digital pins	112-0221
PE42692/PE42694	Oct-08	10	3000	3000	Antenna	112-0221
PE42641	Sep-08	9	2000	2000		05-0035
PE42641	Sep-08	9	4000	2000	Antenna	05-0035
PE42691	Sep-08	10	1500	1500		05-0034
PE42510/PE42650	Aug-08	10	2000	2000		112-0205
PE42674	Jul-08	10	1000	1000		112-0191
PE3341/42	Jun-08	10	250	200	Vpp	05-0030
PE3341/42	Jun-08	10	1000	1000		05-0030
PE4237	Apr-08	10	250	250		05-0024
PE42674	Apr-08	5	1500	1500		112-0178
PE97042	Mar-08	10	1000	1000		112-0176
PE97022	Jan-08	10	1000	1000		112-0171
PE94302	Jan-08	10	1000	500		112-0170
PE42693	Dec-07	10	2000	2000		112-0168
PE4150	Nov-07	10	1500	1000		112-0187
PE42660	Nov-07	10	500	500	Digital pins	112-0165
PE42660	Nov-07	10	3000	1500		112-0165
PE42641	Oct-07	10	2000	2000		112-0164
PE3236/3336	Oct-07	10	1000	1000		05-0011
PE4261	Jun-07	10	1500	1500		112-0157
PE4309	Jun-07	10	2000	2000		112-0155
PE4309	Jun-07	10	2000	2000		112-0156
PE42672	Jun-07	10	500	500		112-0154
PE42672	Jun-07	10	1500	1000		112-0154
PE42660	May-07	10	1000	500	Digital pins	112-0152
PE42660	May-07	10	3000	1500		112-0152

Human Body Model (continued)

Part #	Date	Sample Size	Verified Capability (Volts)	Datasheet Specification (Volts)	Notes	Report #
PE42641	Apr-07	9	2000	2000		05-0003
PE4261	Apr-07	10	1500	1500		112-0151
PE97632	Mar-07	10	300	300	Pin 52	112-0150
PE97632	Mar-07	10	1000	1000	All pins except pin 52	112-0150
PE4261	Mar-07	10	1500	1500	RF Pins	05-0072
PE42672	Dec-06	10	500	500		05-0008
PE42672	Dec-06	10	1500	1000	RF pins	05-0008
PE42612	Oct-06	10	1500	1500		112-0137
PE42742	Sep-06	9	500	500	Digital pins	112-0133
PE42742	Sep-06	9	2000	2000	RF pins	112-0133
PE42672	Sep-06	10	1000	1000	All pins	112-0140
PE42672	Sep-06	10	1500	1000	RF pins	112-0140
PE3238	Sep-06	3	2000	1000		112-0001
PE3501	Sep-06	3	250	250		112-0005
PE42632	May-06	3	1500	1500		112-0124
PE42671	Mar-06	6	1000	1000		112-0127
PE42671	Mar-06	6	1000	1000	Antenna	112-0127
PE42671	Mar-06	6	1500	1000	RF pins	112-0127
PE42672	Mar-06	6	1000	1000		05-0071
PE42660	Nov-05	3	1500	1500		112-0115
PE4273/83/72	Nov-05	3	1500	1500		112-0107
PE4255	Sep-05	3	500	500		112-0111
PE4261	Sep-05	3	1500	1500		05-0098
PE42610	Jul-05	3	2000	1500	Antenna	112-0106
PE4261	Apr-05	3	1500	1500		112-0104
PE42672	Mar-05	3	500	500		112-0128
PE4268	Dec-04	3	1500	1500		112-0099
PE4263	Sep-04	3	1500	1500		112-0092
PE4302	Feb-04	3	500	500		112-0089
PE4259	Nov-03	3	2000	2000		112-0082
PE4140	Nov-03	3	100	100		112-0083
PE4256	Sep-03	3	1000	1000		112-0080
PE3341/42	Aug-03	3	250	200		112-0076
PE9304	Mar-03	3	500	250		112-0068
PE9311/12/13	Mar-03	3	2000	1000		112-0067
PE4232	Jan-03	3	200	200		112-0043
PE4244	Nov-02	3	1500	1500		112-0044
PE4210	Sep-02	3	200	200		112-0032
PE4230	Sep-02	3	250	250		112-0031
PE3335	Feb-01	3	1000	1000		05-0084
PE3501	Nov-00	3	250	250		112-0007

Machine Model

Part #	Date	Sample Size	Verified Capability (Volts)	Datasheet Specification (Volts)	Notes	Report #
PE43204	May-09	10	100	100		112-0227
PE42641	Apr-09	10	100	100	Antenna: 300V	112-0230
PE42742	Mar-09	10	150	100		112-0229
PE43204	Feb-09	10	100	100		112-0219
PE4259	Nov-08	10	100	100		112-0210
PE42552	Oct-08	10	100	100		112-0207
PE42510/PE42650	Aug-08	10	200	200		112-0205
PE42674	Jul-08	10	100	100		112-0191
PE42693	Dec-07	10	100	100		112-0168
PE4256	Sep-07	10	50	50		112-0163
PE4256	Sep-07	10	50	50		112-0163
PE4257	Sep-07	10	50	50		112-0163
PE4257	Sep-07	10	50	50		112-0163
PE4280	Sep-07	10	50	50		112-0163
PE4280	Sep-07	10	50	50		112-0163
PE4261	Jun-07	10	100	100		112-0157
PE42672	Jun-07	10	50	50		112-0154
PE4150	May-07	10	75	75		112-0186
PE42641	Apr-07	9	100	100		05-0003
PE4261	Apr-07	10	100	100		112-0151
PE4261	Mar-07	10	100	100		05-0072
PE42612	Oct-06	10	100	100		112-0137
PE42742	Sep-06	9	100	100		112-0133
PE42672	Sep-06	10	100	50		112-0140
PE42632	May-06	3	100	100		112-0124
PE42671	Mar-06	6	100	100	All pins	112-0127
PE42671	Mar-06	6	200	100	RF pins	112-0127
PE42672	Mar-06	3	100	50		05-0071
PE42660	Nov-05	3	100	100		112-0115
PE4273/83/72	Nov-05	3	100	100		112-0107
PE4255	Sep-05	3	50	50		112-0111
PE4261	Sep-05	3	100	100		05-0098
PE4261	Apr-05	3	100	100		112-0104
PE42672	Mar-05	3	100	50		112-0128
PE4268	Dec-04	3	100	100		112-0099
PE4263	Sep-04	3	100	100		112-0092
PE4302	Feb-04	3	100	100		112-0089
PE4259	Nov-03	3	250	100		112-0082
PE4140	Nov-03	3	50	100		112-0083
PE4256	Sep-03	3	100	50		112-0080
PE3341/42	Aug-03	3	50	50		112-0076
PE4134	May-03	3	50	50		112-0069
PE9304	Mar-03	3	50	50		112-0068
PE9311/12/13	Mar-03	3	200	200		112-0067
PE4220	Jan-03	3	250	250		112-0062

Product – Group Cross Reference Table

Product	Group
3236	PLL
3238	PLL
3239	PLL
3240	PLL
3291	PLL
3293	PLL
3335	PLL
3336	PLL
3339	PLL
3340	PLL
3341	PLL
3342	PLL
3502	PSR
3503	PSR
3511	PSR
3512	PSR
3513	PSR
4120	MXR
4122	MXR
4124	MXR
4125	MXR
4126	MXR
4134	MXR
4135	MXR
4140	MXR
4141	MXR
4150	MXR
4210	SW2
4220	SW2
4230	SW2
4231	SW2
4232	SW2
4235	SW2

Product	Group
4237	SW2
4239	SW2
4240	SW2
4241	SW2
4242	SW2
4243	SW2
4244	SW2
4245	SW2
4246	SW2
4248	SW2
4249	SW2
4250	SW3
4251	SW3
4255	SW3
4256	SW3
4257	SW3
4259	SW3
4261	ASM1
4263	ASM1
4268	ASM1
4269	ASM1
4270	SW3
4271	SW3
4272	SW3
4273	SW3
4274	SW3
4280	SW3
4283	SW3
4302	DSA
4304	DSA
4305	DSA
4306	DSA
4307	DSA

Product	Group
4308	DSA
4309	DSA
9301	PSR
9302	PSR
9303	PSR
9304	PSR
9308	PSR
9309	PSR
9311	PSR
9312	PSR
9313	PSR
9354	SW2
9600	PLL
9601	PLL
9701	PLL
9702	PLL
9704	PLL
9721	PLL
9722	PLL
9763	PLL
42110	ASM2
42112	ASM3
42510	ASM4
42551	ASM2
42610	ASM1
42612	ASM1
42630	ASM1
42631	ASM1
42632	ASM2
42633	ASM3
42641	ASM2
42650	ASM4
42660	ASM2

Product	Group
42662	ASM3
42670	ASM2
42671	ASM2
42672	ASM2
42674	ASM2
42681	ASM2
42691	ASM3
42692	ASM3
42693	ASM2
42694	ASM3
42695	ASM3
42696	ASM3
42742	SW3
43204	DSA
43701	DSA
43703	DSA
62101	DTC
62102	DTC
83335	PLL
83336	PLL
83337	PLL
83339	PLL
83340	PLL
83341	PLL
83342	PLL
83501	PSR
83502	PSR
83503	PSR
83511	PSR
83512	PSR
83513	PSR
84140	MXR