

RELIABILITY MONITOR REPORT  
FOR

**BGA Package**

**Dallas Semiconductor**

4401 South Beltwood Parkway  
Dallas, TX 75244-3292

This Report was prepared by  
Dallas Semiconductor Reliability Engineering

## Summary:

The data in the tables that follow was generated as the result of an on-going Package Reliability Monitor. The assemblies covered by this package monitor are:

ASSY SITE	PINS	PACKAGE		
ASAT	256	CSBGA	ASAT	100 CSBGA (Pb-Free)
ASAT	49	CSBGA (Pb-Free)	ATP (Amkor, PI)	256 BGA
ATP (Amkor, PI)	272	BGA	ATP (Amkor, PI)	100 CSBGA
ATP (Amkor, PI)	16	CSBGA	ATP (Amkor, PI)	169 CSBGA
ATP (Amkor, PI)	25	CSBGA	ATP (Amkor, PI)	256 CSBGA
ATP (Amkor, PI)	49	CSBGA	ATP (Amkor, PI)	16 CSBGA (Pb-Free)
ATP (Amkor, PI)	25	CSBGA (Pb-Free)	ATP (Amkor, PI)	144 TE-PBGA
ATP (Amkor, PI)	144	TECSBGA	ATP (Amkor, PI)	256 TECSBGA
Carsem	25	CSBGA	Stats	256 BGA
Stats	100	CSBGA	Stats	16 CSBGA
Stats	25	CSBGA	Stats	49 CSBGA
Stats	16	CSBGA (Pb-Free)	Stats	25 CSBGA (Pb-Free)

The calculated failure rate for this assembly is:

**FAILURE RATE:**                      **MTTF (YRS): 76847**                      **FITS: 1.5**

The parameters used to calculate this failure rate are as follows:

**Cf: 60%**                      **Ea: 0.7**                      **B: 0**                      **Tu: 25 °C**                      **Vu: 5.5 Volts**

The reliability data follows. At the start of this data is a description of the assembly vehicle used to generate this reliability data. The next section is the detailed reliability data for each stress. The reliability data section includes the latest data available. This report covers data between 7/1/04 and 6/30/05 .

### Assembly Information:

Package Type:                      CSBGA  
Flammability:                      UL 94-V0  
Moisture Sensitivity  
(JEDEC J-STD20A)                      Level 3  
Date Code Range:                      0436      to      0501

### MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
EXTERNAL VISUAL	0436	DS3170	J-STD-020, 6.1a		8	0	
ULTRASOUND			J-STD-020		8	0	
STORAGE LIFE			125C	48 HRS	8		
MOISTURE SOAK			30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW			235C +5/-0C	3 PASS	8	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		8	0	
PRECONDITION U/S			J-STD-020		8	0	
<b>Total:</b>						<b>0</b>	

### OPERATING LIFE

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
HIGH TEMP OP LIFE	0436	DS3170	125C, 3.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0501	DS3254	125C, 3.5 VOLTS	1000 HRS	45	0	
<b>Total:</b>						<b>0</b>	

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**PACKAGE TESTS**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
X-RAY	0436	DS3170	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
BALL SHEAR			JESD22-B117		6	0	
					<b>Total:</b>	<b>0</b>	

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**PRECONDITIONING LEVEL 3**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
STORAGE LIFE	0436	DS3170	125C	48 HRS	276		
MOISTURE SOAK			30C/60% R.H.	192 HRS	276		
CONVECTION REFLOW			235C +5/-0C	3 PASS	276	0	
					<b>Total:</b>	<b>0</b>	

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**STORAGE LIFE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
STORAGE LIFE	0436	DS3170	150C	1000 HRS	72	0	
					<b>Total:</b>	<b>0</b>	

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**TEMPERATURE CYCLE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
TEMP CYCLE	0436	DS3170	-55C TO 125C	1000 CYS	77	0	
					<b>Total:</b>	<b>0</b>	

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**TEMPERATURE HUMIDITY BIAS**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
BIASED MOISTURE	0436	DS3170	85/85, 3.5 VOLTS	1000 HRS	77	0	
					<b>Total:</b>	<b>0</b>	

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**Assembly Information:**

Package Type: CSBGA 17 mm  
Flammability: UL 94-V0  
Moisture Sensitivity (JEDEC J-STD20A) Level 3  
Date Code Range: 0425 to 0448

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**MOISTURE SENSITIVITY LEVEL 3**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
EXTERNAL VISUAL	0429	DS33Z44	J-STD-020, 6.1a		8	0	
ULTRASOUND			J-STD-020		8	0	
STORAGE LIFE			125C	48 HRS	8		
MOISTURE SOAK			30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW			235C +5/-0C	3 PASS	8	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		8	0	
PRECONDITION U/S			J-STD-020		8	0	
					<b>Total:</b>	<b>0</b>	

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**OPERATING LIFE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
HIGH TEMP OP LIFE	0425	DS26528	125C, 3.5 VOLTS	1000 HRS	44	0	
HIGH TEMP OP LIFE	0429	DS33Z44	125C, 3.5V (PSA) & 2.0V (PSB)	1000 HRS	45	0	
HIGH TEMP OP LIFE	0440	DS26556	125C, 3.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0448	DS26334	125C, 3.5 VOLTS	1000 HRS	45	0	
<b>Total:</b>						<b>0</b>	

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**PACKAGE TESTS**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
X-RAY	0429	DS33Z44	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
BALL SHEAR			JESD22-B117		6	0	
<b>Total:</b>						<b>0</b>	

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**PRECONDITIONING LEVEL 3**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
STORAGE LIFE	0429	DS33Z44	125C	48 HRS	276		
MOISTURE SOAK			30C/60% R.H.	192 HRS	276		
CONVECTION REFLOW			235C +5/-0C	3 PASS	276	0	
<b>Total:</b>						<b>0</b>	

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**STORAGE LIFE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
STORAGE LIFE	0429	DS33Z44	150C	1000 HRS	77	0	
<b>Total:</b>						<b>0</b>	

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**TEMPERATURE CYCLE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
TEMP CYCLE	0429	DS33Z44	-55C TO 125C	1000 CYS	77	0	
<b>Total:</b>						<b>0</b>	

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**TEMPERATURE HUMIDITY BIAS**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
BIASED MOISTURE CYCLING	0429	DS33Z44	85/85, 2.0 VOLTS	1000 HRS	45	0	
<b>Total:</b>						<b>0</b>	

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**Assembly Information:**

Package Type: CSBGA 5 mm  
Flammability: UL 94-V0  
Moisture Sensitivity (JEDEC J-STD20A) Level 3  
Date Code Range: 0447 to 0447

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**OPERATING LIFE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
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HIGH TEMP OP LIFE	0447	DS1849	125C, 5.5 VOLTS	1000	HRS	77	0
						<b>Total:</b>	<b>0</b>

**TEMPERATURE CYCLE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
TEMP CYCLE	0447	DS1849	-55C TO 125C	1000	CYS	77	0
						<b>Total:</b>	<b>0</b>

**UNBIASED MOISTURE RESISTANCE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
MOISTURE SOAK	0447	DS1849	85 C/85% R.H.	1000	HRS	77	0
						<b>Total:</b>	<b>0</b>

**Assembly Information:**

Package Type: CSBGA (Pb-Free) 5 mm  
 Flammability: UL 94-V0  
 Moisture Sensitivity (JEDEC J-STD20A) Level 3  
 Date Code Range: 0430 to 0507

**MOISTURE SENSITIVITY LEVEL 3**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
EXTERNAL VISUAL	0430	DS1849	J-STD-020, 6.1a		8	0	
ULTRASOUND			J-STD-020		8	0	
STORAGE LIFE			125C	24	HRS	8	
MOISTURE SOAK			30C/60% R.H.	192	HRS	8	
CONVECTION REFLOW			260C +/-5C	3	PASS	8	0
EXTERNAL VISUAL			J-STD-020, 6.1a		8	0	
PRECONDITION U/S			J-STD-020		8	0	
EXTERNAL VISUAL	0506	DS1849	J-STD-020, 6.1a		8	0	
ULTRASOUND			J-STD-020		8	0	
STORAGE LIFE			125C	24	HRS	8	
MOISTURE SOAK			30C/60% R.H.	192	HRS	8	
CONVECTION REFLOW			260C +/-5C	3	PASS	8	0
EXTERNAL VISUAL			J-STD-020, 6.1a		8	0	
PRECONDITION U/S			J-STD-020		8	0	
EXTERNAL VISUAL	0507	DS1849	J-STD-020, 6.1a		8	0	
ULTRASOUND			J-STD-020		8	0	
STORAGE LIFE			125C	24	HRS	8	
MOISTURE SOAK			30C/60% R.H.	192	HRS	8	
CONVECTION REFLOW			260C +/-5C	3	PASS	8	0
EXTERNAL VISUAL			J-STD-020, 6.1a		8	0	
PRECONDITION U/S			J-STD-020		8	0	
EXTERNAL VISUAL	0507	DS1849	J-STD-020, 6.1a		8	0	
ULTRASOUND			J-STD-020		8	0	
STORAGE LIFE			125C	24	HRS	8	
MOISTURE SOAK			30C/60% R.H.	192	HRS	8	
CONVECTION REFLOW			260C +/-5C	3	PASS	8	0
EXTERNAL VISUAL			J-STD-020, 6.1a		8	0	
PRECONDITION U/S			J-STD-020		8	0	
						<b>Total:</b>	<b>0</b>

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**OPERATING LIFE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
HIGH TEMP OP LIFE	0430	DS1849	125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0506	DS1849	125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0507	DS1849	125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0507	DS1849	125C, 5.5 VOLTS	1000 HRS	77	0	
<b>Total:</b>						<b>0</b>	

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**PACKAGE TESTS**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
X-RAY	0430	DS1849	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
BALL SHEAR			JESD22-B117		6	0	
X-RAY	0506	DS1849	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
BALL SHEAR			JESD22-B117		6	0	
X-RAY	0507	DS1849	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
BALL SHEAR			JESD22-B117		6	0	
X-RAY	0507	DS1849	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
BALL SHEAR			JESD22-B117		6	0	
<b>Total:</b>						<b>0</b>	

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**PRECONDITIONING LEVEL 3**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
STORAGE LIFE	0430	DS1849	125C	24 HRS	308		
MOISTURE SOAK			30C/60% R.H.	192 HRS	308		
CONVECTION REFLOW			260C +0/-5C	3 PASS	308	0	
STORAGE LIFE	0506	DS1849	125C	24 HRS	308		
MOISTURE SOAK			30C/60% R.H.	192 HRS	308		
CONVECTION REFLOW			260C +0/-5C	3 PASS	308	0	
STORAGE LIFE	0507	DS1849	125C	24 HRS	308		
MOISTURE SOAK			30C/60% R.H.	192 HRS	308		
CONVECTION REFLOW			260C +0/-5C	3 PASS	308	0	
STORAGE LIFE	0507	DS1849	125C	24 HRS	308		
MOISTURE SOAK			30C/60% R.H.	192 HRS	308		
CONVECTION REFLOW			260C +0/-5C	3 PASS	308	0	
<b>Total:</b>						<b>0</b>	

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**STORAGE LIFE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
STORAGE LIFE	0430	DS1849	150C	1000 HRS	76	0	
STORAGE LIFE	0506	DS1849	150C	1000 HRS	77	0	
STORAGE LIFE	0507	DS1849	150C	1000 HRS	77	0	

STORAGE LIFE	0507	DS1849	150C	1000 HRS	77	0
				<b>Total:</b>		<b>0</b>

**TEMPERATURE CYCLE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
TEMP CYCLE	0430	DS1849	-55C TO 125C	1000 CYS	77	0	
TEMP CYCLE	0506	DS1849	-55C TO 125C	1000 CYS	77	0	
TEMP CYCLE	0507	DS1849	-55C TO 125C	1000 CYS	77	0	
TEMP CYCLE	0507	DS1849	-55C TO 125C	1000 CYS	77	0	
				<b>Total:</b>		<b>0</b>	

**UNBIASED MOISTURE RESISTANCE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
MOISTURE SOAK	0430	DS1849	85 C/85% R.H.	1000 HRS	77	0	
MOISTURE SOAK	0506	DS1849	85 C/85% R.H.	1000 HRS	75	0	
MOISTURE SOAK	0507	DS1849	85 C/85% R.H.	1000 HRS	76	0	
MOISTURE SOAK	0507	DS1849	85 C/85% R.H.	1000 HRS	77	0	
				<b>Total:</b>		<b>0</b>	

**FAILURE RATE:**                      **MTTF (YRS): 76847**                      **FITS: 1.5**