

RELIABILITY MONITOR REPORT  
FOR

**PBGA 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	ASSY SITE	PINS	PACKAGE
ASAT DongGuan	24	PBGA w/WIRE BOND and CRYST	ASAT DongGuan	36	PBGA w/WIRE BOND and CRYST
ASAT Hong Kong	36	PBGA w/WIRE BOND and CRYST	ATP (Amkor, PI)	256	MCMBGA
ATP (Amkor, PI)	300	MCMBGA	ATP (Amkor, PI)	256	MCMBGA (Pb-Free)
ATP (Amkor, PI)	300	MCMBGA (Pb-Free)	ATP (Amkor, PI)	256	PBGA
ATP (Amkor, PI)	272	PBGA	ATP (Amkor, PI)	256	PBGA (Pb-Free)
ATP (Amkor, PI)	144	PBGA-TE	ATP (Amkor, PI)	400	PBGA-TE
ATP (Amkor, PI)	484	PBGA-TE	ATP (Amkor, PI)	256	PBGA-TE (Pb-Free)
Carsem	36	PBGA w/WIRE BOND and CRYST	Dallas	36	PBGA w/SOIC and CRYSTAL
SCS (Stats Chippac S	256	MCMBGA	SCS (Stats Chippac S	300	MCMBGA
SCS (Stats Chippac S	256	PBGA			

The calculated failure rate for this assembly is:

**FAILURE RATE:                      MTTF (YRS): 23383                      FITS: 4.9**

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 10/1/2005 and 9/30/2006.

**Assembly Information:**

Package Type:                      MCMBGA (Pb-Free) 27x27x1.73  
 Flammability:                      UL 94-V0  
 Moisture Sensitivity                      Level 4  
 (JEDEC J-STD20A)  
 Date Code Range:                      0611 to 0611

**MOISTURE SENSITIVITY LEVEL 3**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
ULTRASOUND	0611	DS21Q352	J-STD-020		8	0	
STORAGE LIFE			125C	48 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	
ULTRASOUND	0611	DS21Q352	J-STD-020		8	0	
STORAGE LIFE			125C	48 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>	

**OPERATING LIFE**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
HIGH TEMP OP LIFE	0611	DS21Q352	125C, 3.5 VOLTS	1000 HRS	77	0	

HIGH TEMP OP LIFE	0611	DS21Q352	125C, 3.5 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	0611	DS21Q352	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
BALL SHEAR			JESD22-B117		6	0	
X-RAY	0611	DS21Q352	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	0611	DS21Q352	125C	48 HRS	308		
MOISTURE SOAK			30C/60% R.H.	192 HRS	308		
CONVECTION REFLOW			260C +0/-5C	3 PASS	308	0	
STORAGE LIFE	0611	DS21Q352	125C	48 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	0611	DS21Q352	150C	1000 HRS	77	0	
STORAGE LIFE	0611	DS21Q352	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	0611	DS21Q352	-55C TO 125C	1000 CYS	77	0	
TEMP CYCLE	0611	DS21Q352	-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	0611	DS21Q352	85/85, 3.5 VOLTS	1000 HRS	45	0	
BIASED MOISTURE	0611	DS21Q352	85/85, 3.5 VOLTS	1000 HRS	45	0	
<b>Total:</b>						<b>0</b>	

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**Assembly Information:**

Package Type: PBGA 11.43x10.16x3.16  
 Flammability: UL 94-V0  
 Moisture Sensitivity (JEDEC J-STD20A) Level 4  
 Date Code Range: 0614 to 0617

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**MOISTURE SENSITIVITY LEVEL 3**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
ULTRASOUND	0614	DS32KHZ	J-STD-020		22	0	
STORAGE LIFE			125C	48 HRS	22		
MOISTURE SOAK			30C/60% R.H.	192 HRS	22		
CONVECTION REFLOW			220C +5/-0C	2 PASS	22	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		22	0	
PRECONDITION U/S			J-STD-020		22	0	
ULTRASOUND	0616	DS32KHZ	J-STD-020		22	0	
STORAGE LIFE			125C	48 HRS	22		
MOISTURE SOAK			30C/60% R.H.	192 HRS	22		
CONVECTION REFLOW			220C +5/-0C	2 PASS	22	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		22	0	
PRECONDITION U/S			J-STD-020		22	0	
ULTRASOUND	0617	DS32KHZ	J-STD-020		22	0	
STORAGE LIFE			125C	48 HRS	22		
MOISTURE SOAK			30C/60% R.H.	192 HRS	22		
CONVECTION REFLOW			220C +5/-0C	2 PASS	22	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		22	0	
PRECONDITION U/S			J-STD-020		22	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	0614	DS32KHZ	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
MARK PERMANENCY			JESD22-B107		6	0	
BALL SHEAR			JESD22-B117		6	0	
X-RAY	0616	DS32KHZ	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
MARK PERMANENCY			JESD22-B107		6	0	
BALL SHEAR			JESD22-B117		6	0	
X-RAY	0617	DS32KHZ	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
MARK PERMANENCY			JESD22-B107		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	0614	DS32KHZ	125C	48 HRS	276		
MOISTURE SOAK			30C/60% R.H.	192 HRS	276		
CONVECTION REFLOW			220C +5/-0C	2 PASS	276	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		276	0	
X-RAY			MIL-STD-883-2012 : TOP & SIDE VIEW		276	0	
PRECONDITION U/S			J-STD-020		276	0	
STORAGE LIFE	0616	DS32KHZ	125C	48 HRS	276		
MOISTURE SOAK			30C/60% R.H.	192 HRS	276		
CONVECTION REFLOW			220C +5/-0C	2 PASS	276	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		276	0	

X-RAY	0616	DS32KHZ	MIL-STD-883-2012 : TOP & SIDE VIEW			276	0
PRECONDITION U/S			J-STD-020			276	0
STORAGE LIFE	0617	DS32KHZ	125C	48	HRS	276	
MOISTURE SOAK			30C/60% R.H.	192	HRS	276	
CONVECTION REFLOW			220C +5/-0C	2	PASS	276	0
EXTERNAL VISUAL			J-STD-020, 6.1a			276	0
X-RAY			MIL-STD-883-2012 : TOP & SIDE VIEW			276	0
PRECONDITION U/S			J-STD-020			276	0
<b>Total:</b>						<b>0</b>	<b>0</b>

### STORAGE LIFE

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
STORAGE LIFE	0614	DS32KHZ	125C	1000 HRS	77	0	
STORAGE LIFE	0616	DS32KHZ	125C	1000 HRS	77	0	
STORAGE LIFE	0617	DS32KHZ	125C	1000 HRS	77	0	
<b>Total:</b>						<b>0</b>	<b>0</b>

### TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
TEMP CYCLE	0614	DS32KHZ	-40 TO 85C	1000 CYS	77	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		77	0	
PRECONDITION U/S			J-STD-020		77	0	
TEMP CYCLE	0616	DS32KHZ	-40 TO 85C	1000 CYS	77	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		75	0	
PRECONDITION U/S			J-STD-020		75	0	
TEMP CYCLE	0617	DS32KHZ	-40 TO 85C	1000 CYS	77	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		77	0	
PRECONDITION U/S			J-STD-020		77	0	
<b>Total:</b>						<b>0</b>	<b>0</b>

### TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
BIASED MOISTURE	0614	DS32KHZ	85/85, 5.5 VOLTS	1000 HRS	45	0	
<b>Total:</b>						<b>0</b>	<b>0</b>

### UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
MOISTURE SOAK	0614	DS32KHZ	85 C/85% R.H.	1000 HRS	77	0	
MOISTURE SOAK	0616	DS32KHZ	85 C/85% R.H.	1000 HRS	77	0	
MOISTURE SOAK	0617	DS32KHZ	85 C/85% R.H.	1000 HRS	77	0	
<b>Total:</b>						<b>0</b>	<b>0</b>

### Assembly Information:

Package Type: PBGA-TE 27x27x2.33  
 Flammability: UL 94-V0  
 Moisture Sensitivity (JEDEC J-STD20A) Level 3  
 Date Code Range: 0536 to 0536

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**MOISTURE SENSITIVITY LEVEL 3**

DESCRIPTION	DATE CODE	TEST VEHICLE	CONDITION	READPOINT	QUANTITY	FAILS	FA NO
ULTRASOUND	0536	DS33R41	J-STD-020		8	0	
STORAGE LIFE			125C	48 HRS	8		
MOISTURE SOAK			30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW			220C +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	0536	DS33R41	125C, 3.5V (PSA) & 2.0V (PSB)	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	0536	DS33R41	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	0536	DS33R41	125C	48 HRS	308		
MOISTURE SOAK			30C/60% R.H.	192 HRS	308		
CONVECTION REFLOW			220C +5/-0C	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	0536	DS33R41	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	0536	DS33R41	-55C TO 125C	1000 CYS	76	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	0536	DS33R41	85/85, 2.0 VOLTS	1000 HRS	45	0	
					<b>Total:</b>	<b>0</b>	

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**FAILURE RATE:****MTTF (YRS): 23383****FITS: 4.9**