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RELIABILITY REPORT
FOR

DS3144, Rev A1

Dallas Semiconductor

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Conclusion:

The following qualification successfully meets the quality and reliability standards required of all Dallas Semiconductor products and processes:

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In addition, Dallas Semiconductor's continuous reliability monitor program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards. The current status of the reliability monitor program can be viewed at http://www.maxim-ic.com/TechSupport /dsreliability.html.

Device Description:

A description of this device can be found in the product data sheet. You can find the product data sheet at http://dbserv.maxim-ic.com/l_datasheet3.cfm.

Reliability Derating:

The Arrhenius model will be used to determine the acceleration factor for failure mechanisms that are temperature accelerated.

AfT = exp((Ea/k)*(1/Tu - 1/Ts)) = tu/ts
AfT = Acceleration factor due to Temperature
tu = Time at use temperature (e.g. 55°C)
ts = Time at stress temperature (e.g. 125°C)
k = Boltzmann's Constant (8.617 x 10-5 eV/°K)
Tu = Temperature at Use (°K)
Ts = Temperature at Stress (°K)
Ea = Activation Energy (e.g. 0.7 ev)

The activation energy of the failure mechanism is derived from either internal studies or industry accepted standards, or activation energy of 0.7ev will be used whenever actual failure mechanisms or their activation energies are unknown. All deratings will be done from the stress ambient temperature to the use ambient temperature.

An exponential model will be used to determine the acceleration factor for failure mechanisms, which are voltage accelerated.

AfV = exp(B*(Vs - Vu))
AfV = Acceleration factor due to Voltage
Vs = Stress Voltage (e.g. 7.0 volts)
Vu = Maximum Operating Voltage (e.g. 5.5 volts)
B = Constant related to failure mechanism type (e.g. 1.0, 2.4, 2.7, etc.)

The Constant, B, related to the failure mechanism is derived from either internal studies or industry accepted standards, or a B of 1.0 will be used whenever actual failure mechanisms or their B are unknown. All deratings will be done from the stress voltage to the maximum operating voltage. Failure rate data from the operating life test is reported using a Chi-Squared statistical model at the 60% or 90% confidence level (Cf).

The failure rate, Fr, is related to the acceleration during life test by:

Fr = X/(ts * AfV * AfT * N * 2)
X = Chi-Sq statistical upper limit
N = Life test sample size

Failure Rates are reported in FITs (Failures in Time) or MTTF (Mean Time To Failure). The FIT rate is related to MTTF by:

MTTF = 1/Fr

NOTE: MTTF is frequently used interchangeably with MTBF.

The calculated failure rate for this device/process is:

FAILURE RATE: MTTF (YRS): 65690 FITS: 1.7

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. A the start of this data is the device information. Following this is the assembly information. This section includes a description of the assembly vehicle used to generate this reliability data. The next section is the detailed reliability data for each stress. If there are additional assemblies used as part of this report, a description of each will follow which includes the respective reliability data for that assembly. The reliability data section includes the latest data available.

Device Information:

Process:	1P, 4M,0.35um, Sil.P1, Ti/TiN M1-M4 ,BPSG,Masked N+ES
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	249 x 247
Number of Transistors:	6600000
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	75 Å

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
ESD SENSITIVITY	0238	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0238	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0238	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0238	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	1	2
ESD SENSITIVITY	0238	EOS/ESD S5.1 HBM 8000 VOLTS	1	PUL'S	0	3
LATCH-UP	0238	JESD78, I-TEST 125C			3	0
LATCH-UP	0238	JESD78, Vsupply TEST 125C			3	0
ESD SENSITIVITY	0224	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0224	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0224	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0224	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	3
ESD SENSITIVITY	0224	EOS/ESD S5.1 HBM 8000 VOLTS	1	PUL'S	3	3
LATCH-UP	0224	JESD78, I-TEST 125C			6	0
LATCH-UP	0224	JESD78, Vsupply TEST 125C			6	0
				Total:		**11**

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS

INFANT LIFE	0042	125C, 3.5 VOLTS	48	HRS	269	0
HIGH VOLTAGE LIFE	0042	125C, 3.5 VOLTS	2000	HRS	157	1
HIGH VOLTAGE LIFE	0109	125C, 3.5 VOLTS	1000	HRS	80	0
HIGH VOLTAGE LIFE	0134	125C, 3.5 VOLTS	1000	HRS	77	0
HIGH VOLTAGE LIFE	0131	125C, 3.5 VOLTS	1000	HRS	77	0
HIGH VOLTAGE LIFE	0143	125C, 3.5 VOLTS	336	HRS	77	0
HIGH VOLTAGE LIFE	0150	125C, 3.5 VOLTS	1000	HRS	77	0
HIGH VOLTAGE LIFE	0152	125C, 3.5 VOLTS	1000	HRS	80	0
HIGH VOLTAGE LIFE	0213	125C, 3.5 VOLTS	1000	HRS	71	0
HIGH VOLTAGE LIFE	0222	125C, 3.5 VOLTS	1000	HRS	45	0
HIGH VOLTAGE LIFE	0231	125C, 3.5 VOLTS	1000	HRS	77	0
HIGH VOLTAGE LIFE	0230	125C, 3.5 VOLTS	1000	HRS	77	0
HIGH VOLTAGE LIFE	0233	125C, 3.5 VOLTS	1000	HRS	77	0
HIGH VOLTAGE LIFE	0224	125C, 3.5 VOLTS	1000	HRS	45	0
HIGH VOLTAGE LIFE	0244	125C, 3.5 VOLTS	1000	HRS	45	0
HIGH VOLTAGE LIFE	0234	125C, 3.5 VOLTS	1000	HRS	45	0
HIGH VOLTAGE LIFE	0244	125C, 3.5 VOLTS	192	HRS	42	0
				Total:		**1**

STORAGE LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
STORAGE LIFE	0224	150C	1000	HRS	77	0
STORAGE LIFE	0244	150C	1000	HRS	75	0
STORAGE LIFE	0234	150C	1000	HRS	77	0
STORAGE LIFE	0244	150C	1000	HRS	77	0
				Total:		**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
TEMP CYCLE	0042	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0134	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0131	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0150	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0233	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0224	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0244	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0234	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0244	-55C TO 125C	1000	CYS	77	0
				Total:		**0**

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS

BIASED MOISTURE	0042	85/85, 3.5 VOLTS	959	HRS	29	0
BIASED MOISTURE	0224	85/85, 3.5 VOLTS	1000	HRS	45	0
BIASED MOISTURE	0244	85/85, 3.5 VOLTS	1000	HRS	45	0
				Total:		**0**

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
HAST, NO BIAS	0134	130C, 85% R.H.	200	HRS	77	0
HAST, NO BIAS	0131	130C, 85% R.H.	200	HRS	77	0
HAST, NO BIAS	0150	130C, 85% R.H.	200	HRS	77	0
HAST, NO BIAS	0233	130C, 85% R.H.	200	HRS	77	0
MOISTURE SOAK	0234	85 C/85% R.H.	1000	HRS	45	0
MOISTURE SOAK	0244	85 C/85% R.H.	1000	HRS	77	0
				Total:		**0**

Assembly Information:

Assembly Site:	ATP (Amkor, PI)
Pin Count:	144
Package Type:	TECSBGA
Body Size:	13x13x1.4
Mold Compound:	Sumitomo 7730L
Lead Frame:	Printed Crt Brd; BT
Lead Finsh:	
Die Attach:	Ablebond 2300
Bond Wire / Size:	Au / 1.0 mil
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 3
Date Code Range:	0224 to 0244

CONSTRUCTION ANALYSIS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
PACKAGE, ASSEMBLY P	0234	TO BE SUBMITTED BY ASSEMBLY SITE			0	0
				Total:		**0**

MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
EXTERNAL VISUAL	0224	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	3	PASS	8	0
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0
PRECONDITION U/S		J-STD-020			8	0
EXTERNAL VISUAL	0234	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	3	PASS	8	0

EXTERNAL VISUAL	0234	J-STD-020, 6.1a			8	0
PRECONDITION U/S		J-STD-020			8	0
EXTERNAL VISUAL	0244	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	3	PASS	8	0
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0
PRECONDITION U/S		J-STD-020			8	0
				Total:		**0**

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
HIGH VOLTAGE LIFE	0224	125C, 3.5 VOLTS	1000	HRS	45	0
HIGH VOLTAGE LIFE	0234	125C, 3.5 VOLTS	1000	HRS	45	0
HIGH VOLTAGE LIFE	0244	125C, 3.5 VOLTS	1000	HRS	45	0
				Total:		**0**

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
X-RAY	0224	MIL-STD-883-2012 : TOP & SIDE VIEW			6	0
PHYSICAL DIMENSIONS		JESD22-B100			6	0
BALL SHEAR		JESD22-B117			6	0
X-RAY	0234	MIL-STD-883-2012 : TOP & SIDE VIEW			6	0
PHYSICAL DIMENSIONS		JESD22-B100			6	0
BALL SHEAR		JESD22-B117			6	0
X-RAY	0244	MIL-STD-883-2012 : TOP & SIDE VIEW			6	0
PHYSICAL DIMENSIONS		JESD22-B100			6	0
BALL SHEAR		JESD22-B117			6	0
				Total:		**0**

PRECONDITIONING LEVEL 3

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
STORAGE LIFE	0224	125C	48	HRS	244	
MOISTURE SOAK		30C/60% R.H.	192	HRS	244	
CONVECTION REFLOW		235C	3	PASS	244	0
STORAGE LIFE	0234	125C	48	HRS	244	
MOISTURE SOAK		30C/60% R.H.	192	HRS	244	
CONVECTION REFLOW		235C	3	PASS	244	0
STORAGE LIFE	0244	125C	48	HRS	244	
MOISTURE SOAK		30C/60% R.H.	192	HRS	244	
CONVECTION REFLOW		235C	3	PASS	244	0
				Total:		**0**

STORAGE LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
STORAGE LIFE	0224	150C	1000	HRS	77	0
STORAGE LIFE	0234	150C	1000	HRS	77	0
STORAGE LIFE	0244	150C	1000	HRS	75	0

						Total:	**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
TEMP CYCLE	0224	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0234	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0244	-55C TO 125C	1000	CYS	77	0
				Total:		**0**

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
BIASED MOISTURE	0224	85/85, 3.5 VOLTS	1000	HRS	45	0
BIASED MOISTURE	0244	85/85, 3.5 VOLTS	1000	HRS	45	0
				Total:		**0**

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
MOISTURE SOAK	0234	85 C/85% R.H.	1000	HRS	45	0
				Total:		**0**

FAILURE RATE: **MTTF (YRS): 65690** **FITS: 1.7**