



1/9/2008

**PRODUCT RELIABILITY REPORT  
FOR**

**DS2782, Rev A3**

**Maxim Integrated Products**

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**Conclusion:**

The following qualification successfully meets the quality and reliability standards required of all Maxim products:

DS2782, Rev A3

In addition, Maxim'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](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<sup>-5</sup> 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:

<b>FAILURE RATE:</b>	<b>MTTF (YRS):</b>	<b>104206</b>	<b>FITS:</b>	<b>1.1</b>
	<b>DEVICE HOURS:</b>	<b>799192</b>	<b>FAILS:</b>	<b>0</b>

Only data from Operating Life or similar stresses are used for this calculation.

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

**Cf: 60%**      **Ea: 0.7**      **B: 0**      **Tu: 25 °C**      **Vu: 4.2 Volts**

The reliability data follows. At the start of this data is the device information. The next section is the detailed reliability data for each stress. The reliability data section includes the latest data available and may contain some generic data. **Bold** Product Number denotes specific product data.

**Device Information:**

Process: E35X-3P3M,DPE2,CrSi,DSD,PDES,D,PDRES,Cap,ENPN,DPT,HTO,SgHalo  
 Passivation: TEOS Ox-Nit Passivation for E35X; Full BEOL at SA; PT only in Dallas  
 Die Size: 97 x 108  
 Number of Transistors: 106383  
 Interconnect: Aluminum / 0.5% Copper  
 Gate Oxide Thickness: 120 Å

**DATA RETENTION**

DESCRIPTION	DATE CODE/PRODUCT/LOT	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0618 DS2746 QJ626604B	150C	1000 HRS	77	0	
STORAGE LIFE	0629 DS2745 QD635241	150C	1000 HRS	77	0	
			<b>Total:</b>		<b>0</b>	

**ELECTRICAL CHARACTERIZATION**

DESCRIPTION	DATE CODE/PRODUCT/LOT	CONDITION	READPOINT	QTY	FAILS	FA#
ESD SENSITIVITY	0737 <b>DS2782</b> QK751033	EOS/ESD S5.1 HBM 500 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0737 <b>DS2782</b> QK751033	EOS/ESD S5.1 HBM 1000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0737 <b>DS2782</b> QK751033	EOS/ESD S5.1 HBM 2000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0737 <b>DS2782</b> QK751033	EOS/ESD S5.1 HBM 4000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0737 <b>DS2782</b> QK751033	EOS/ESD S5.1 HBM 8000 VOLTS	1 PUL'S	3	0	
LATCH-UP	0737 <b>DS2782</b> QK751033	JESD78, I-TEST 125C		6	0	
LATCH-UP	0737 <b>DS2782</b> QK751033	JESD78, V-SUPPLY TEST 125C		6	0	
			<b>Total:</b>		<b>0</b>	

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**OPERATING LIFE**

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH TEMP OP LIFE	0601	DS3908 QE614607	125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0617	DS4420 QJ633620B	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH VOLTAGE LIFE	0618	DP20 DRI0CA006	135C, 5.0 V	1000 HRS	45	0	
HIGH VOLTAGE LIFE	0618	DP20 DRI0CA006	135C, 5.0 V	1000 HRS	45	0	
HIGH VOLTAGE LIFE	0618	DP20 DRI0CA006	135C, 5.0 V	1000 HRS	45	0	
HIGH TEMP OP LIFE	0618	DS2746 QJ626604B	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0626	DS1863 QM623600	125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0629	DS2745 QD635241	125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0640	DS2756 QK621609	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0642	DS2786 QJ652645A	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0714	DS2784 QJ714637A	125C, 5.5 V (PSA) & 15.0 V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0723	DS2786 QJ801005B	125C, 5.5 VOLTS	192 HRS	45	0	
HIGH TEMP OP LIFE	0727	DS2781 QK738184	125C, 5.5 VOLTS	192 HRS	77	0	
HIGH TEMP OP LIFE	0732	DS2784 QJ738201B	125C, 5.5 V (PSA) & 15.0 V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0732	DS1099 IJ611604AF	125C, 5.5 VOLTS	408 HRS	45	0	
HIGH TEMP OP LIFE	0732	DS1099 IJ611604AF	125C, 5.5 VOLTS	408 HRS	32	0	
HIGH TEMP OP LIFE	0736	DS2788 QK718177	125C, 5.5 VOLTS	192 HRS	77	0	
HIGH TEMP OP LIFE	0744	DS2745 QD801003	125C, 5.5 VOLTS	192 HRS	77	0	
HIGH TEMP OP LIFE	0749	<b>DS2782</b> QK805005	125C, 5.5 VOLTS	192 HRS	77	0	
				<b>Total:</b>		<b>0</b>	

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**W/E ENDURANCE AND DATA RET'N**

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOINT	QTY	FAILS	FA#
WRITE CYCLE STRESS (KCYS)	0601	DS3908 QE614607	70 C, 5.5 VOLTS	50 KCYS	77	0	
STORAGE LIFE	0601	DS3908 QE614607	150C	1000 HRS	76	0	
WRITE CYCLE STRESS (KCYS)	0626	DS1863 QM623600	85 C, 5.5 VOLTS	50 KCYS	77	0	
STORAGE LIFE	0626	DS1863 QM623600	150C	1000 HRS	77	0	
WRITE CYCLE STRESS (KCYS)	0640	DS2756 QK621609	70 C, 5.5 VOLTS	50 KCYS	77	0	
STORAGE LIFE	0640	DS2756 QK621609	150C	1000 HRS	77	0	
WRITE CYCLE STRESS (KCYS)	0642	DS2786 QJ652645A	50 C, 5.5 VOLTS (PSA), 15.0 VOLTS (PSB)	10 KCYS	77	0	
STORAGE LIFE	0642	DS2786 QJ652645A	150C	1000 HRS	77	0	
WRITE CYCLE STRESS (KCYS)	0642	DS2786 QJ652645A	50 C, 5.5 VOLTS (PSA), 15.0 VOLTS (PSB)	1 KCYS	77	0	
STORAGE LIFE	0642	DS2786 QJ652645A	150C	1000 HRS	77	0	
WRITE CYCLE STRESS (CYS)	0642	DS2786 QJ652645A	50 C, 5.5 VOLTS (PSA), 15.0 VOLTS (PSB)	100 CYS	77	0	
STORAGE LIFE	0642	DS2786 QJ652645A	150C	1000 HRS	77	0	

WRITE CYCLE STRESS (KCYS)	0714	DS2784	QJ714637A	50 C, 5.5 V (PSA) & 15.0 V (PSB)	50	KCYS	77	0
STORAGE LIFE	0714	DS2784	QJ714637A	150C	1000	HRS	77	0
WRITE CYCLE STRESS (KCYS)	0732	DS2784	QJ738201B	50 C, 5.5 V (PSA) & 15.0 V (PSB)	50	KCYS	77	0
STORAGE LIFE	0732	DS2784	QJ738201B	150C	1000	HRS	77	0
WRITE CYCLE STRESS (KCYS)	0736	DS2788	QK718177	50 C, 5.5 VOLTS	50	KCYS	77	0
STORAGE LIFE	0736	DS2788	QK718177	150C	96	HRS	77	0
WRITE CYCLE STRESS (KCYS)	0749	<b>DS2782</b>	QK805005	50 C, 5.5 VOLTS	50	KCYS	77	0
STORAGE LIFE	0749	<b>DS2782</b>	QK805005	150C	96	HRS	77	0
					<b>Total:</b>			<b>0</b>

<b>FAILURE RATE:</b>	<b>MTTF (YRS):</b>	<b>104206</b>	<b>FITS:</b>	<b>1.1</b>
	<b>DEVICE HOURS:</b>	<b>799192</b>	<b>FAILS:</b>	<b>0</b>