

1/16/2014



**PRODUCT RELIABILITY REPORT  
FOR**

**DS1629, Rev B3**

**Maxim Integrated**

**14460 Maxim Dr.  
Dallas, TX 75244**

**Approved by:**

**Don Lipps  
Manager, Reliability Engineering**

**Conclusion:**

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

DS1629, Rev B3

In addition, Maxim Integrated'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.maximintegrated.com/qa/reliability/monitor>.

**Device Description:**

A description of this device can be found in the product data sheet. You can find the product data sheet at <http://www.maximintegrated.com/search/parts.mvp>.

**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:

**FAILURE RATE:**                      **MTTF (YRS):**      **581235**      **FITS:**              **0.2**  
**DEVICE HOURS:** **4665398172**      **FAILS:**              **0**

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: 5.5 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: SA E35W-0.5um, 5V CMOS with embedded Array EEPROM, embedded RSE EEPROM, 18V CMOS, VNP, P2-P1 Cap, LVMOSCAP, HVMOSCAP, Varactor Cap, NTC poly R's, 3LM, M3 Laser Fuses  
 Passivation: TEOS Oxide-Nitride Passivation  
 Die Size: 70 x 94  
 Number of Transistors: 46324  
 Interconnect: Aluminum / 0.5% Copper  
 Gate Oxide Thickness: 120 Å

**ESD HBM**

DESCRIPTION	DATE CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
ESD SENSITIVITY	1341 <b>DS1629</b>	ZJ489579BB- JESD22-A114 HBM 500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1341 <b>DS1629</b>	ZJ489579BB- JESD22-A114 HBM 1000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1341 <b>DS1629</b>	ZJ489579BB- JESD22-A114 HBM 1500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1341 <b>DS1629</b>	ZJ489579BB- JESD22-A114 HBM 2000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1341 <b>DS1629</b>	ZJ489579BB- JESD22-A114 HBM 2500 VOLTS	1	PUL'S	5	0
<b>Total:</b>					<b>0</b>	

**LATCH-UP**

DESCRIPTION	DATE CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
LATCH-UP I	1341 <b>DS1629</b>	ZJ489579BB- JESD78A, I-TEST 25C 100mA		6	0	
LATCH-UP I	1341 <b>DS1629</b>	ZJ489579BB- JESD78A, I-TEST 25C 250mA		6	0	
LATCH-UP V	1341 <b>DS1629</b>	ZJ489579BB- JESD78A, V-SUPPLY TEST 25C		6	0	
<b>Total:</b>					<b>0</b>	

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**OPERATING LIFE**

DESCRIPTION	DATE CODE	PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
HIGH TEMP REVERSE BIAS	0447	DSQ3301-K01	QH449599A 125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP REVERSE BIAS	0504	DSQ3301-K01	QH518151A 125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP REVERSE BIAS	0504	DSQ3301-K01	QH518151AF 125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP REVERSE BIAS	0525	DSQ3301-K01	QJ533120AB 125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP REVERSE BIAS	0526	DSQ3301-K01	QJ533120AC 125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP REVERSE BIAS	0611	DSQ3301-K01	IH533120AA 125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0839	DS2784	WJ942986TC 125C, 4.6 V (PSA) & 15.0 V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0843	DS2784	WJ941766O 125C, 4.6 V (PSA) & 15.0 V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0845	DS2431	WJ943331AB 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0845	DS2431	WJ943238Q 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0846	DS28EC20	WJ941331D 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0846	DS28EC20	WJ942984PB 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0846	DS28EC20	WJ943330BB 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0846	DS28EC20	WJ942984PB 125C, 5.25 VOLTS	408 HRS	80	0	
HIGH TEMP OP LIFE	0848	DS2784	WJ943239LC 125C, 4.6 V (PSA) & 15.0 V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0848	DS2431	WJ943235BB 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0914	DS2780	WJ944804AB 125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0916	DS2784	WJ943240IC- 125C, 5.5 V (PSA) & 15.0 V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0916	DS2784	WJ945481A 125C, 5.5 V (PSA) & 15.0 V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0921	DSQC5G1	WJ946371A 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0921	DSQC5G1	WJ946370A 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0922	DS36A92	WJ946542AB 125C, 3.6 VOLTS	192 HRS	45	0	
HIGH TEMP OP LIFE	0925	DSQC5G1	WJ945484A 125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0932	MAX17043	WJ946441P 125C, 4.5V (PSA) & 9.2V (PSB)	192 HRS	45	0	
HIGH TEMP OP LIFE	0933	DS1873	QJ917612BC 125C, 4.2 VOLTS	192 HRS	77	0	

HIGH TEMP OP LIFE	0936	DSRB1	WJ046370D	125C, 3.65 VOLTS	192	HRS	77	0
HIGH TEMP OP LIFE	0937	DS2784	WJ046898JC	125C, 5.5 V (PSA) & 15.0 V (PSB)	1000	HRS	77	0
HIGH TEMP OP LIFE	0940	DS2784	WJ048759A	125C, 5.5 V (PSA) & 15.0 V (PSB)	1000	HRS	80	0
HIGH TEMP OP LIFE	0946	DS1876	WJ048840AA	125C, 4.2 VOLTS	192	HRS	77	0
HIGH TEMP OP LIFE	0948	DS1091L	WJ946344EA	150C, 3.6 VOLTS	408	HRS	45	0
HIGH TEMP OP LIFE	0948	DS1091L	WJ946344EA	150C, 3.6 VOLTS	408	HRS	45	0
HIGH TEMP OP LIFE	0951	DS2784	WJ049559AB	125C, 5.5 V (PSA) & 15.0 V (PSB)	1000	HRS	80	0
HIGH TEMP OP LIFE	0951	DS1877	WJ048842AA	125C, 4.2 VOLTS	192	HRS	77	0
HIGH TEMP OP LIFE	0951	DS2430A	WH048838A	125C, 5.25 VOLTS	192	HRS	50	0
HIGH TEMP OP LIFE	1004	DS3644	WS046549D	125C, 3.6V (PSA) & 3.3V (PSB)	192	HRS	45	0
HIGH TEMP OP LIFE	1004	MAX66140	WJ050342AB	125C, 3.3 VOLTS	192	HRS	45	0
HIGH TEMP OP LIFE	1009	DS1624	WJ048844BB	125C, 5.5 VOLTS	192	HRS	77	0
HIGH TEMP OP LIFE	1012	MAX36051	WS048836A	125C, 3.6 VOLTS	192	HRS	45	0
HIGH TEMP OP LIFE	1013	DS2431	WJ052466AB	150C, 5.25 VOLTS	408	HRS	50	0
HIGH TEMP OP LIFE	1013	DS2431	WJ052268AB	150C, 5.25 VOLTS	408	HRS	50	0
HIGH TEMP OP LIFE	1013	DS2784	WJ050375AB	125C, 5.5 V (PSA) & 15.0 V (PSB)	1000	HRS	80	0
HIGH TEMP OP LIFE	1014	DS2431	WJ052527AB	150C, 5.25 VOLTS	408	HRS	50	0
HIGH TEMP OP LIFE	1023	DS2784	WJ051728AB	125C, 5.5 V (PSA) & 15.0 V (PSB)	1000	HRS	80	0
HIGH TEMP OP LIFE	1026	DS3231M	QJ048856AB	125C, 5.5 VOLTS	1000	HRS	45	0
HIGH TEMP OP LIFE	1026	DS3231M	QJ048856AB	125C, 5.5 VOLTS	1000	HRS	45	0
HIGH TEMP OP LIFE	1026	DS3231M	QJ048856AB	125C, 5.5 VOLTS	1000	HRS	45	0
HIGH TEMP OP LIFE	1033	DS2784	FJ050283AB	125C, 5.5V (PSA) & 5.5V (PSB)	1000	HRS	77	0
HIGH TEMP OP LIFE	1034	MAX17040	WS049701A	125C, 5.5V (PSA) & 5.5V (PSB)	1000	HRS	48	0
HIGH TEMP OP LIFE	1035	DS1878	WJ055999BA	125C, 5.5 VOLTS	192	HRS	77	0
HIGH TEMP OP LIFE	1037	DSQ3301-K04+	WW156001E	125C, 5.25 VOLTS	192	HRS	45	0
HIGH TEMP OP LIFE	1039	MAX31722	ZJ148849DB	125C, 3.7V (PSA)	192	HRS	48	0
HIGH TEMP OP LIFE	1041	DS3660	ZS156014AB	125C, 3.6V (PSA) & 3.3V (PSB)	213	HRS	48	0
HIGH TEMP OP LIFE	1041	DS2784	ZJ160290AB	125C, 5.5V (PSA) & 5.5V (PSB)	192	HRS	80	0

HIGH TEMP OP LIFE	1041	DS2784	ZJ160290AB	125C, 4.6 V (PSA) & 4.6 V (PSB)	1000 HRS	80	0
HIGH TEMP OP LIFE	1046	DS2431	ZJ163079AC	125C, 5.25 VOLTS	192 HRS	77	0
HIGH TEMP OP LIFE	1047	DS24B33	ZU156000CB	125C, 5.25 VOLTS	192 HRS	77	0
HIGH TEMP OP LIFE	1048	DS2784	ZJ162667AB-	125C, 4.6 V (PSA) & 4.6 V (PSB)	1000 HRS	80	0
HIGH TEMP OP LIFE	1108	DS3640	ZX148848AA	125C, 3.6V (PSA) & 3.9V (PSB)	192 HRS	45	0
HIGH TEMP OP LIFE	1110	DS2431	FH163875AC	125C, 5.25 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	1113	DS2431	FJ165741AA	125C, 5.25 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	1122	DS3231M	ZX166109AB	125C, 5.5 VOLTS	1000 HRS	64	0
HIGH TEMP OP LIFE	1122	DS3231M	ZX166109AB	125C, 5.5 VOLTS	1000 HRS	64	0
HIGH TEMP OP LIFE	1122	DS3231M	ZX166109AB	125C, 5.5 VOLTS	1000 HRS	45	0
HIGH TEMP REVERSE BIAS	1122	DSQ3301-K04+	ZJ166825AC	125C, 5.5 VOLTS	1000 HRS	77	0
HIGH TEMP REVERSE BIAS	1123	DSQ3301-K04+	ZJ166825AC	125C, 5.5 VOLTS	1000 HRS	77	0
HIGH TEMP REVERSE BIAS	1124	DSQ3301-K04+	ZJ166825AC	125C, 5.5 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	1124	DS28E01	FH166745AB	125C, 5.25 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	1124	DS2704R	FU165980AC	125C, 5.5 VOLTS	1000 HRS	80	0
HIGH TEMP OP LIFE	1125	DSKCP60	ZD167395BB	125C, 5.5 VOLTS	192 HRS	77	0
HIGH TEMP OP LIFE	1135	DS28EC20	ZJ272094AB-	125C, 5.25 VOLTS	192 HRS	77	0
HIGH TEMP OP LIFE	1135	DS2704R	FJ268977AD	125C, 5.5 VOLTS	1000 HRS	80	0
HIGH TEMP OP LIFE	1150	DS3232M	ZX272110AA	125C, 4.7 VOLTS (PSA)	240 HRS	80	0
HIGH TEMP OP LIFE	1150	DS3232M	ZX272110AB	125C, 4.7 VOLTS (PSA)	192 HRS	80	0
HIGH TEMP OP LIFE	1205	MAX31826	ZD272115AB	125C, 3.6 VOLTS	192 HRS	80	0
HIGH TEMP OP LIFE	1210	MAX31722	FK148849DD	125C, 3.7V (PSA)	1000 HRS	50	0
HIGH TEMP OP LIFE	1210	MAX31722	FK148849DD	125C, 3.7V (PSA)	1000 HRS	30	0
HIGH TEMP OP LIFE	1221	MAX36025	Z4223800AB	125C, 1.8V (PSB) & 3.3V (PSA)	192 HRS	80	0
HIGH TEMP REVERSE BIAS	1221	DS2431	ZX278253AB	125C, 5.25 VOLTS	1000 HRS	77	0
HIGH TEMP REVERSE BIAS	1221	DS2431	ZX278253AC	125C, 5.25 VOLTS	1000 HRS	77	0
HIGH TEMP REVERSE BIAS	1221	DS2431	ZX278253AE	125C, 5.25 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	1221	DS3231M	FX278007AA	125C, 5.5 VOLTS	1000 HRS	80	0

HIGH TEMP OP LIFE	1224	DS28E01	FH278427AE	125C, 5.25 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	1239	MAX36025	Z4223800AB	125C, 1.8V (PSB) & 3.3V (PSA)	1000 HRS	80	0
HIGH TEMP OP LIFE	1239	MAX36025	Z4223800AC	125C, 1.8V (PSB) & 3.3V (PSA)	1000 HRS	80	0
HIGH TEMP OP LIFE	1240	MAX36025	Z4223800AD	125C, 1.8V (PSB) & 3.3V (PSA)	1000 HRS	80	0
HIGH TEMP OP LIFE	1303	DS2431	FH277189AD	125C, 5.25 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	1341	<b>DS1629</b>	ZJ489579BB-	125C, 5.5 VOLTS	192 HRS	80	0
HIGH TEMP OP LIFE	1342	DS28E01	ZJ390802AB	125C, 5.25 VOLTS	500 HRS	80	0
HIGH TEMP OP LIFE	1342	DS28E01	ZJ390802AB	125C, 5.25 VOLTS	500 HRS	80	0
HIGH TEMP OP LIFE	1342	DS28E01	ZJ390802AB	125C, 5.25 VOLTS	500 HRS	80	0
HIGH TEMP OP LIFE	1342	DS28E01	ZJ390802AB	125C, 5.25 VOLTS	500 HRS	80	0
HIGH TEMP OP LIFE	1342	DS28E01	ZJ390802AB	125C, 5.25 VOLTS	500 HRS	80	0
HIGH TEMP OP LIFE	1342	DS28E01	ZJ390802AB	125C, 5.25 VOLTS	500 HRS	80	0

**Total: 0**

**FAILURE RATE:                    MTTF (YRS):            581235            FITS:            0.2**  
**DEVICE HOURS: 4665398172    FAILS:            0**