

8/12/2015



**PRODUCT RELIABILITY REPORT
FOR**

MAX71315

Maxim Integrated

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

Approved by:

**Sokhom Chum
MTS, Reliability Engineering**

Conclusion:

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

MAX71315

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 10⁻⁵ 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:

$$\text{MTTF} = 1/\text{Fr}$$

NOTE: MTTF is frequently used interchangeably with MTBF.

The calculated failure rate for this device/process is:

FAILURE RATE: **MTTF (YRS):** **38519** **FITS:** **3.0**
DEVICE HOURS: **309184476** **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** 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: Grace 0.18um ULL embedded flash process
Passivation: SiO/SiN
Die Size: 128.34646 x 157.48031
Number of Transistors: 4080000
Interconnect: Aluminum / 0.5% Copper

ESD HBM

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
ESD SENSITIVITY	1349	MAX71315 Z4143883AB	JESD22-A114 HBM 500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1349	MAX71315 Z4143883AB	JESD22-A114 HBM 1000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1349	MAX71315 Z4143883AB	JESD22-A114 HBM 1500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1349	MAX71315 Z4143883AB	JESD22-A114 HBM 2000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1349	MAX71315 Z4143883AB	JESD22-A114 HBM 2500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315 Z4143837HA	JESD22-A114 HBM 500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315 Z4143837HA	JESD22-A114 HBM 1000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315 Z4143837HA	JESD22-A114 HBM 1500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315 Z4143837HA	JESD22-A114 HBM 2000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315 Z4143837HA	JESD22-A114 HBM 2500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315 Z4143883CA	JESD22-A114 HBM 500 VOLTS	1	PUL'S	5	0

ESD SENSITIVITY	1423	MAX71315	Z4143883CA	JESD22-A114 HBM 1000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315	Z4143883CA	JESD22-A114 HBM 1500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315	Z4143883CA	JESD22-A114 HBM 2000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1423	MAX71315	Z4143883CA	JESD22-A114 HBM 2500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1426	MAX71315	Z4143934FA-	JESD22-A114 HBM 500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1426	MAX71315	Z4143934FA-	JESD22-A114 HBM 1000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1426	MAX71315	Z4143934FA-	JESD22-A114 HBM 1500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1426	MAX71315	Z4143934FA-	JESD22-A114 HBM 2000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1426	MAX71315	Z4143934FA-	JESD22-A114 HBM 2500 VOLTS	1	PUL'S	5	0
Total:								0

LATCH-UP

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
LATCH-UP I	1349	MAX71315	Z4143883AB JESD78A, I-TEST 25C 100mA		6	0	
LATCH-UP V	1349	MAX71315	Z4143883AB JESD78A, V-SUPPLY TEST 25C		6	0	
LATCH-UP I	1423	MAX71315	Z4143837HA JESD78A, I-TEST 25C 100mA		6	0	
LATCH-UP V	1423	MAX71315	Z4143837HA JESD78A, V-SUPPLY TEST 25C		6	0	
LATCH-UP I	1423	MAX71315	Z4143883CA JESD78A, I-TEST 25C 100mA		6	0	
LATCH-UP V	1423	MAX71315	Z4143883CA JESD78A, V-SUPPLY TEST 25C		6	0	
LATCH-UP I	1426	MAX71315	Z4143934FA- JESD78A, I-TEST 25C 100mA		6	0	
LATCH-UP V	1426	MAX71315	Z4143934FA- JESD78A, V-SUPPLY TEST 25C		6	0	
Total:							0

OPERATING LIFE

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
HIGH TEMP OP LIFE	1349	MAX71315	Z4143883AB 125C, 5.0V (PSB) & 3.6V (PSA)	192 HRS	80	0	
HIGH TEMP OP LIFE	1423	MAXQ611	ZX143931QE 125C, 3.6 VOLTS	192 HRS	48	0	
HIGH TEMP OP LIFE	1423	MAXQ611	ZX143931QE 125C, 3.6 VOLTS	192 HRS	32	0	
HIGH TEMP OP LIFE	1432	MAX71335L	ZK154101TA 125C, 5.0V (PSB) & 3.6V (PSA)	192 HRS	80	0	
HIGH TEMP OP LIFE	1432	MAX71314L	ZK154004TA 125C, 5.0V (PSB) & 3.6V (PSA)	192 HRS	80	0	
HIGH TEMP OP LIFE	1437	MAXQ611	ZX156368AB 125C, 3.6 VOLTS	1000 HRS	48	0	

HIGH TEMP OP LIFE	1437	MAXQ611	ZX156368AC 125C, 3.6 VOLTS	1000 HRS	48	0
HIGH TEMP OP LIFE	1437	MAXQ611	ZX156368AD 125C, 3.6 VOLTS	1000 HRS	48	0
HIGH TEMP OP LIFE	1504	DS28E07	ZH156629BB 125C, 5.25 VOLTS	192 HRS	79	0
HIGH TEMP OP LIFE	1512	MAX71336S	Z4154550AV 120C, 5.0V (PSB), 3.6V (PSA)	192 HRS	80	0
HIGH TEMP OP LIFE	1514	MAX71315S	Z4154550AA 125C, 5.0V (PSB) & 3.6V (PSA)	1000 HRS	80	0
HIGH TEMP OP LIFE	1515	DS28E07	ZH155787AB 125C, 5.25 VOLTS	192 HRS	80	0

Total: **0**

FAILURE RATE: **MTTF (YRS):** **38519** **FITS:** **3.0**
DEVICE HOURS: **309184476** **FAILS:** **0**