

1/28/2014



**PRODUCT RELIABILITY REPORT
FOR**

DS3177

Maxim Integrated

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

Approved by:

**Sokhom Chum
SMTS, Reliability Engineering**

Conclusion:

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

DS3177

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:

$$MTTF = 1/Fr$$

NOTE: MTTF is frequently used interchangeably with MTBF.

The calculated failure rate for this device/process is:

FAILURE RATE: **MTTF (YRS):** **80138** **FITS:** **1.4**
DEVICE HOURS: **643239972** **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: 3.5** **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: Global/Chartered 0.35um Analog, double poly, quad metal salicide/polycide, retrograde well, w/ ESD, w/o DNW and MIM.
Passivation: SiN / SiO2
Die Size: 207 x 244
Number of Transistors: 470000
Interconnect: Aluminum / 0.5% Copper

ESD CDM

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
ESD SENSITIVITY	1320	DS3177	ZK137193BB JESD22-C101 CDM 250 VOLTS	3	PUL'S	5	0
ESD SENSITIVITY	1320	DS3177	ZK137193BB JESD22-C101 CDM 500 VOLTS	3	PUL'S	5	0
ESD SENSITIVITY	1320	DS3177	ZK137193BB JESD22-C101 CDM 750 VOLTS	3	PUL'S	5	0
Total:						0	

ESD HBM

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
ESD SENSITIVITY	1320	DS3177	ZK137193BB JESD22-A114 HBM 500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1320	DS3177	ZK137193BB JESD22-A114 HBM 1000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1320	DS3177	ZK137193BB JESD22-A114 HBM 1500 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1320	DS3177	ZK137193BB JESD22-A114 HBM 2000 VOLTS	1	PUL'S	5	0
ESD SENSITIVITY	1320	DS3177	ZK137193BB 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 V	1320 DS3177	ZK137193BB JESD78A, V-SUPPLY TEST 25C		6	0	
LATCH-UP I	1320 DS3177	ZK137193BB JESD78A, I-TEST 25C 100mA		12	0	
			Total:		0	

OPERATING LIFE

DESCRIPTION	DATE CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
HIGH VOLTAGE LIFE	0047 DS21Q44	ZC044371BA 125C, 3.5 VOLTS	1000 HRS	116	0	
HIGH VOLTAGE LIFE	0116 DS21Q42	ZC109147BA 125C, 3.5 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0152 DS2174	DK148046BA 125C, 3.5 VOLTS	1000 HRS	80	0	
HIGH TEMP OP LIFE	0319 DS31412	ZS344075BC 125C, 3.5 VOLTS	1000 HRS	46	0	
HIGH TEMP OP LIFE	0417 DS21458	ZK447252AB 125C, 3.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0518 DS21458	QK539078A 125C, 3.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0536 DS33R41	QK561458C 125C, 3.5V (PSA) & 2.0V (PSB)	1000 HRS	45	0	
HIGH TEMP OP LIFE	0706 DS33R41	QK562042AJ 125C, 3.5V (PSA) & 2.0V (PSB)	1000 HRS	45	0	
HIGH TEMP OP LIFE	0831 DS33R41	QK080847AJ 125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0	
HIGH TEMP OP LIFE	0831 DS33R41	QK080847A 125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0	
HIGH TEMP OP LIFE	0831 DS33R41	QK080847AI 125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0	
HIGH TEMP OP LIFE	1320 DS3177	ZK137193BB 125C, 3.5 VOLTS	1000 HRS	45	0	
			Total:		0	

FAILURE RATE:**MTTF (YRS):****80138****FITS:****1.4****DEVICE HOURS:****643239972****FAILS:****0**