ECLIPTEK® CORPORATION

Qualification and Reliability Report

Series: EMRB64

Qualification Tests (Based on guidance from JESD47)				
Test	*Method/Condition*	*Test*	*Pass*	*Fail*
Aging	Biased, Nominal V_{DD}, 85°C, 168 hours	120	120	0
Early Life Failure Rate (ELFR)	JESD22-A108, Biased, Maximum V_{DD}, 125°C, 168 hours	1543	1543	0
High Temp Operating Life	JESD22-A108, Biased, Maximum V_{DD}, 125°C, 1000 hours	637	637	0
ESD Susceptibility	JESD22-A114, HBM, 3000V	3	3	0
	JESD22-A114, MM, 300V	3	3	0
	JESD22-A115, CDM, 750V	3	3	0
Latchup	JEDEC STD-JESD78, 100mA @ 85°C	6	6	0
NVM High Temp Storage	JESD22-A117, Biased, Maximum V_{DD}, 125°C, 1000 hours	93	93	0
NVM High Temp Operating Life	JESD22-A117, Biased, Maximum V_{DD}, 150°C, 1000 hours	95	95	0
Flammability	UL94-V0	24	24	0
Mechanical Shock	MIL-STD-883, Method 2002, Condition E, 10,000G's	154	154	0
Vibration, Variable Frequency	MIL-STD-883, Method 2007, Condition C, 70G's	144	144	0
Vibration Fatigue	MIL-STD-883, Method 2005, Condition A, 20G's, 125°C, 1000 hours	144	144	0
Constant Acceleration	MIL-STD-883, Method 2001, Condition E, 30kG's, Y1 Axis	197	197	0
High Temp Storage	JESD22-A103, 125°C, 1000 hours	290	290	0
Temperature Cycle	JESD22-A104, Condition C, -65°C to +150°C, 1000 cycles	77	77	0
Highly Accelerated Temp and Humidity Stress Test	JESD22-A110, Biased, 130°C, 85% RH, 96 hours	157	157	0
Moisture Sensitivity Level	JESD22-A113, MSL = 1, 260°C	180	180	0
Solderability	MIL-STD-883, Method 2003 (Pads on bottom of package only)	66	66	0
Mechanical Dimensions	Per Datasheet	48	48	0
Electrical Parameter Assessment	Per Datasheet	48	48	0

Reliability Data Information		
Characteristic	*Constant*	*Value*
Number of Units	*N*	637
Hours Tested	*t*	1,000
Number of Failures	*r*	0
Hours to Failure	t_i	0
Activation Energy (eV)	*Ea*	0.7
Boltzman's Constant	*k*	8.62×10^{-5}
Test Stress Temperature (°C)	*T1*	125
Ambient Use Temperature (°C)	*T2*	25
X^2 Degrees of Freedom (DF)	*v*	2*r*+ 2
X^2 Confidence Level (%)	*α*	90

$$FIT = \frac{(\chi^2_{[\alpha,v]}/2)\cdot 1{,}000{,}000{,}000}{\sum\left[r\cdot t_i\cdot e^{\frac{Ea}{k}\cdot\left(\frac{1}{T1+273}-\frac{1}{T2+273}\right)}\right]+\left[N\cdot t\cdot e^{\frac{Ea}{k}\cdot\left(\frac{1}{T1+273}-\frac{1}{T2+273}\right)}\right]} \qquad MTTF = 1{,}000{,}000{,}000 / FIT$$

Reliability Calculations (Based on JESD85 - Methods for Calculating Failure Rates in Units of FITs)		
Parameter	*Failures in Time (FIT)*	*Mean Time To Failure (MTTF)*
Calculation	4 units / 1×10^9 Hours	260,301,813 Hours / Failure

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