ECLIPTEK® CORPORATION

Qualification and Reliability Report

Series: EMML13

Qualification Tests				
Test	Method/Condition	Test	Pass	Fail
Aging	Biased, Nominal V_{DD}, Temperature = 85°C, Duration = 30 days	120	120	0
Autoclave	JESD22-A102, 121°C, 100% RH, 15 PSIG, 96 hours	240	240	0
ESD Susceptibility	MIL-STD-883 Method 3015, Class 2, HBM = 2,000V JESD22-C101, CDM = 500V	36	36	0
Flammability	UL94-V0	24	24	0
High Temperature Operating Life	MIL-STD-883 Method 1005, Condition B, Biased, 125°C, 1,000 hours	240	240	0
High Temperature Storage	MIL-STD-883 Method 1008, 150°C, 1,000 hours	240	240	0
Highly Accelerated Temperature and Humidity Stress Test	JESD22-A110, Biased, 130°C, 85% RH, 96 hours	240	240	0
Latchup	JESD17, 200mA @ 25°C	24	24	0
Mechanical Dimensions	Per Datasheet	48	48	0
Mechanical Shock	MIL-STD-883 Method 2002 Condition G, 30,000G's, 0.12msec, ½ sine	120	120	0
Moisture Sensitivity Level	JESD22-A113, MSL = 1, 260°C	180	180	0
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition K, 250°C, 30 seconds	120	120	0
Resistance to Solvents	MIL-STD-202, Method 215	120	120	0
Solderability	MIL-STD-883, Method 2003 (Pads on bottom of package only)	120	120	0
Temperature Cycle	JESD22-A104, -65°C to +150°C, 1,000 cycles	240	240	0
Thermal Shock	MIL-STD-883 Method 1011 Condition B, -55°C to 125°C, 200 Cycles	180	180	0
Vibration	MIL-STD-883 Method 2007 Condition A, 20G's	120	120	0

Reliability Tests				
Test	Method/Condition	Test	Pass	Fail
Vibration	MIL-STD-883, Method 2007, 20 G's	160	160	0
Mechanical Shock	MIL-STD-883, Method 2002, 1,500G's, 0.5msec, ½ sine	160	160	0
Temperature Cycle	MIL-STD-883, Method 1010, -55°C to +125°C, 10 cycles	160	160	0
Aging	Biased, Nominal V_{DD}, Temperature = 85°C, Duration = 720 hours	160	160	0

Reliability Data		
Characteristic	*Constant*	*Value*
Number of Units	*N*	160
Hours Tested	*t*	1,000
Activation Voltage	*Ea*	0.7eV
Boltzman's Constant	*k*	8.62×10^{-5}
Aging Temperature	*T1*	85°C
Ambient Temperature	*T2*	25°C
Confidence Level	$X^2_{(CL,\ 2\ dof)}$	90%

Reliability Calculations	
Parameter	***Value***
Failures in Time (*FIT*)	**15 units / 1 x 10^9 Hours**
Mean Time To Failure (*MTTF*)	**67,175,000 hours / Failure**

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

$$MTTF = 1{,}000{,}000{,}000 / FIT$$

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