

Reliability Report

Report Title: MXHV9910 Qualification Report

Report Number: 2008-007

Date: 10/22/08

Introduction:

The purpose of this qualification was to verify the Clare's Quality and Reliability requirements as outlined in P0425WW for releasing the product MXHV9910. The MXHV9910 was manufactured at Clare's state of the art fabrication site in Beverly, MA using the P11.2, a BCDMOS on SOI Process and assembled at Orient Semiconductor Electronics Philippines, Inc. (OSEP), Philippines and available on SOIC – 8L EP packages.

Product Description:

The MXHV9910 drives an external MOSFET at a fixed oscillator frequency set by an external resistor. Peak constant current to an LED string is maintained by modulating the MOSFET Gate signal on and off through the external sense resistor connected to the CS input. The MXHV9910 can operate from 8v to 450v. This highly versatile input operating voltage enables a broad range of high brightness (HB) LED applications. The driver features a fixed-frequency, peak-current control method, which provides an ideal solution for driving multiple LEDs in series and in parallel.

Key Product Characteristics:

Part Number	MXHV9910	Package Type	SOIC – 8L EP
Package Bond Wire	1.0 mil dia. AU	Package Mold Compound	Sumitomo EME G600
Wafer Fab. Process	P11.2	Package Die Attach	Silver Conductive Epoxy
Max. Power Dissip.	2.5 W	Package Lead Finish	Matte Sn (100%)
Passivation Layer	Si3N4 (Si Rich)	Package MSL	1
Bond Pad Metal	AlCu	Max. Peak Reflow Temp.	260°C
Assembly Location	OSEP, Philippines		

Qualification Test Plan:

Table 1 below provides the qualification tests that were performed for this qualification and as part of the Reliability Monitoring Program afterwards. The stress tests and sample size are chosen based on the Clare's specification P-04-25-WW, "Reliability, Risk Analysis and Qualification Procedure" and with the consent of the product development team.

Table 1: Qualification Tests Plan

Stress Test	Applicable Specs	Stress Conditions	Product/ Package	Number of Lots	Sample Size (SS)	Total SS
HTRB	Mil-Std-883	105°C, 80%	MXHV9910 SOIC – 8L EP	1	77	77
ESD HBM	JESD22, A114-E	1.5kΩ, 100pF	MXHV9910 SOIC – 8L EP	1	14	14

Qualification Test Results:

The stress tests and associated results for the MXHV9910 qualification are summarized in Table 2.

The devices chosen for the qualification were from standard material manufactured through normal production test flow and electrically tested to datasheet limits prior to stressing. Then reliability stresses were conducted and electrically tested to datasheet limit at each interval and final readpoints. Any parts that did not meet the datasheet limits were considered failures. A team of Engineers evaluated the failures upon conducting a complete Failure Analysis (FA) for each of the failure to decide whether the failure is valid or invalid.

Table 2: MXHV9910 Qualification Tests Results

Stress Test	Kits Number	Readpoint 1 / (Reject/ SS)	Readpoint 2 / (Reject/ SS)	Comments
HTRB	IXYS 9910-00G 0806	1000 hrs.	1500 hrs.	Qual lot#1 data
		0/77	0/77	

ESD Testing Results:

As part of this qualification, MXHV9910 was subjected to Human Body Model (HBM) ESD Sensitivity Classification testing using a KeyTek Zapmaster system. The results are summarized in Table 3. All samples were electrically tested to data sheet limits before and after ESD stressing and they passed after +/-750V zapping.

Table3: MXHV9910 ESD Characterization Results

ESD Model	Kit Number	Package	ESD Test Spec	RC Network	Highest Passed	Class
HBM	IXYS 9910-00G 0825	SOIC – 8L EP	JESD22, A114-E	1.5kΩ, 100pF	750 V	1B

Process FIT (Failure in Time) Data:

The Table 3 below summarizes the number of devices used for MXHV9910 reliability stress with associated failures. Using the HTRB data, FITs were calculated based on the Acceleration Factor (AF) and equivalent device hours at 0.7eV of activation energy according to the Clare's procedure P-04-25-WW for 105°C test temperature and 40°C use temperatures. The calculated FITs from the reliability stress came out to be 91.83 for HTRB.

Table 3: FITs calculation Summary

Qual#	Stress	Kits	# of Devices	# of Fails	Hours Tested	Act. Energy	Acc. Factor	Equivalent Dev. Hours	FIT Rate @ 60% CL
1	HTRB	IXYS 9910-00G 0806	77	0	1500	0.7	86.74	10,018,525.33	91.83

Conclusion:

The qualification of the MXHV9910 has successfully completed for the production release.

APPROVAL:

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