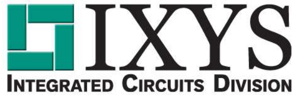

Reliability Report

Reliability Data for LCB7XX DIP Style Package
(Low Voltage 60V – 100V, Form B)

Report Title: Reliability Data for LCB7XX DIP Style Package
(Low Voltage 60V – 100V, Form B)

Report Number: 2012-007B

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Introduction:

This report summarizes the Reliability data of IXYS Integrated Circuits Division LCB7XX. The Reliability data presented here were collected during IXYS product qualification. The purpose of this qualification was to verify the IXYS Quality and Reliability requirements as outlined in IXYS internal specifications. The LCB7XX silicon is manufactured at IXYS Integrated Circuits Division in Beverly, MA USA and assembled at Atec in the Philippines.

Reliability Tests:

Table 1 below provides the qualification tests that were performed. The stress tests and sample size are chosen based on the IXYS internal specification and with the approval of the product development team and quality assurance.

Table 1: Product LCB7XX Reliability Tests

Stress Test	Applicable Specs	Stress Conditions	Product/ Package	Number of Lots	Sample Size (SS)	Total SS
HTRB	Mil-Std-883	125°C, 80%	LCB716S 8 Pin SOP	2	129 150	279
THB	JESD22, A101	85°C, 85% 1000hrs	LCB716S 8 Pin SOP	3	77	231
Thermal Shock (T/S)	Mil-Std-883, M1011	0 to 100°C, 10/10 dwells, 15 cycles	LCB716S 8 Pin SOP	1	55	55
Temp Cycle (T/C)	Mil-Std-883, N1010, “B”	-55 to 125°C, 10/10 dwells, 300 cycles	LCB716S 8 Pin SOP	1	55	55
High Temp Storage	JESD22-A103C	125°C, 1000hrs	LCB716S 8 Pin SOP	1	50	50
MSL	J-STD-020D.1	IR Reflow, Level 1	LCB716S 8 Pin SOP	1	50	50
ESD HBM	JESD22, A114-E	1.5kΩ, 100pF	LCB716S 8 Pin SOP	1	3	3

Reliability Test Results:

The stress tests and associated results for the product LCB7XX 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.

Table 2: Product LCB7XX Reliability Test Results

Stress Test	Product/Kit Number	Readpoint / (Reject/ SS)	Comments
HTRB	LCB716S T50164	1000 hrs. 0/129	Qual Lot#1 Data
HTRB	LCB716S TE2690	1000 hrs. 0/150	Qual Lot#2 Data
THB	LCB716S TE2690	1000 hrs. 0/77	Qual Lot#1 Data
THB	LCB716S TE2824	1000 hrs. 0/77	Qual Lot#2Data
THB	LCB716S TE2825	1000 hrs. 0/77	Qual Lot#3 Data
Thermal Shock	LCB716S T50164	15 Cycles 0/55	Qual Lot#1Data
Temp Cycle	LCB716S T50164	300 Cycles 0/55	Qual Lot#1 Data
High Temp Storage	LCB716S T50164	1000 hrs. 0/50	Qual Lot#1 Data
MSL	LCB716S T50164	IR Reflow Level 1 0/50	Qual Lot#1 Data

ESD Testing Results:

As part of this qualification, the product LCB7XX 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 +/-8000V testing.

Table3: Product LCB7XX ESD Characterization Results

ESD Model	Product/Kit Number	Package	ESD Test Spec	RC Network	Highest Passed	Class
HBM	LCB716S T50164	8 Pin SOP	JESD22, A114-E	1.5kΩ, 100pF	8000V	3B

FIT (Failure in Time) Rate on the Product LCB7XX:

Table 4 summarizes the number of devices used for the product LCB7XX 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 for 125°C test temperature and 40°C use temperatures. For THB stress, FITs were calculated based on the 85°C /85% RH test condition with 40°C/60% RH ambient use conditions at the activation energy of 0.7 eV and equivalent device hours. The calculated FITs from the reliability stress came out to be 12.91 and 35.05 for HTRB and THB, respectively.

Table 4: Product LCB7XX FIT Rate Summary

Qual#	Stress	Product/Kit Number	# of Devices	# of Fails	Hours Tested	Act. Energy	Acc. Factor	Equivalent Dev. Hours	FIT Rate @ 60% CL
1	HTRB	LCB716S T50164	279	0	1000	0.7	255.41	71,258,265	12.91
1	THB	LCB716S TE2690 TE2824 TE2825	231	0	1000	0.7	1.1363E-02	26,247,604	35.05

Conclusion:

The qualification of the product LCB7XX has been successfully completed for the production release.

APPROVAL:

Prepared by: _Martha W. Brandt*________________________________5/9/12___________
Martha W. Brandt — Date
Quality Engineer

Approved by: _Michael Stanton*___________________________________5/15/12__________
Michael Stanton — Date
Product Engineer

Approved by: _Ronald P. Clark*___________________________________5/15/12___________
Ronald P. Clark — Date
Director of Quality

*Signature on File