



# **Reliability Report**

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

**Report Title: Reliability Data for LCB7XX DIP Style Package  
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**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**

<b>Stress Test</b>	<b>Applicable Specs</b>	<b>Stress Conditions</b>	<b>Product/ Package</b>	<b>Number of Lots</b>	<b>Sample Size (SS)</b>	<b>Total SS</b>
HTRB	Mil-Std-883	125°C, 80%	LCB716S 6 Pin SOP	2	129 150	279
THB	JESD22, A101	85°C, 85% 1000hrs	LCB716S 6 Pin SOP	3	77	231
Thermal Shock (T/S)	Mil-Std-883, M1011	0 to 100°C, 10/10 dwells, 15 cycles	LCB716S 6 Pin SOP	1	55	55
Temp Cycle (T/C)	Mil-Std-883, N1010, “B”	-55 to 125°C, 10/10 dwells, 300 cycles	LCB716S 6 Pin SOP	1	55	55
High Temp Storage	JESD22- A103C	125°C, 1000hrs	LCB716S 6 Pin SOP	1	50	50
MSL	J-STD- 020D.1	IR Reflow, Level 1	LCB716S 6 Pin SOP	1	50	50
ESD HBM	JESD22, A114-E	1.5kΩ, 100pF	LCB716S 6 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**

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

**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**

<b>ESD Model</b>	<b>Product/Kit Number</b>	<b>Package</b>	<b>ESD Test Spec</b>	<b>RC Network</b>	<b>Highest Passed</b>	<b>Class</b>
HBM	LCB716S T50164	6 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**

<b>Qual#</b>	<b>Stress</b>	<b>Product/Kit Number</b>	<b># of Devices</b>	<b># of Fails</b>	<b>Hours Tested</b>	<b>Act. Energy</b>	<b>Acc. Factor</b>	<b>Equivalent Dev. Hours</b>	<b>FIT Rate @ 60% CL</b>
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