F²MC-8FX/16LX/16FX/FR FAMILY
8/16/32-BIT MICROCONTROLLER
ALL SERIES

LIN CONFORMANCE TEST

APPLICATION NOTE
Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Issue</th>
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<tbody>
<tr>
<td>2008-08-28</td>
<td>V1.0; 1st version; MWi/HWe</td>
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This document contains 11 pages.
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0 Introduction

This application note describes the procedure for LIN conformance tests to get a LIN certification for a product.
1 LIN Conformance Test Procedure

HOW LIN CONFORMANCE TESTS ARE DONE

1.1 Overall Information

Up-to-date information about LIN compliance test can be found on the official LIN web page:
http://www.lin-subbus.org → COMPLIANCE

In summary the conformance test is used to verify the functionality of a LIN device according to the current LIN specification. The current version is 2.1 (July 2008).

A conformance test specification is currently under development. Only LIN 2.0 physical layer conformance test should be applied according LIN 2.0 physical layer specification, which did not change in version 2.1.

It is important to know, that a compliance test only can be performed for a complete system. The test cannot be done for LIN software drivers or ECUs without application. This means also, that an MCU without on-chip LIN line driver/physical transceiver has to be tested together with a selected external LIN line driver IC.

Any changes or modifications in hard or software lead to the need of a new conformance test qualification.

Please note that because of these reasons the LIN certification is different from CAN certification.

1.2 Test Items

The following items can be tested for LIN compliance.

- LIN component
- LIN device
- LIN implementation
- ECU

1.3 German Test Houses

LIN conformance tests are offered currently by three German test houses, which are specialized for these tests. All houses offer tests for the LIN OSI layer 1 (Physical layer) and LIN OSI layer 2 (Data link layer). The contact persons and addresses can be found in the appendix A (→2). These test houses are:

- Communication & Systems group (C&S group), FH Braunschweig/Wolfenbuettel
- Ihr GmbH, Buehl
- Micron Electronic Devices AG, Neutraubling

All these three test houses have acquired the “Testhouse Accreditation Certificate” from the LIN steering group.

1.4 Test Types

There are two basic conformance tests for

- Physical Layer
- Data Link Layer
Additionally some test houses also offer tests for EMC and/or SAE-J2602 conformance. All tests are appropriate for LIN master and LIN slave systems.

Please refer to test house documentation for exact test cases and concept.

1.4.1 Physical Layer Tests
The physical layer tests contain mostly the electrical and timing characteristics of the item under test (IUT). This implies for example signal threshold voltages, propagation delays, duty cycle of the signals, \( V_{\text{BAT}} \) shifts, internals resistance and capacity, etc.

1.4.2 Data Link Layer Tests
The data link layer tests contain tests for the LIN protocol itself. This implies for example synch break length measurement, oscillator tolerance, message frame length, slave response frame investigation, bit error tests, etc.

For Node Configuration / Network Management there are tests for error in frames, wake-up behavior, sleep mode tests, frame ID assignment, NAD (Node Address for Diagnostic) assignment tests, etc.

1.4.3 EMC Tests
Some test houses offer also EMC tests for electrical immunity to external disturbance such as transients or ESD and emission of the IUT.

1.4.4 SAE-J2602 Tests
Some test houses also offer tests for SAE-J2602 standard, which is generally used by US American OEMs. SAE-J2602 is based on LIN 2.0 specification with some differences. Please refer SAE-J2602 specification for more details.
2 Appendix A

CONTACT DATA OF TEST HOUSES

2.1 C&S Group

Address:
Administration
C&S group
Fachhochschule Braunschweig / Wolfenbuettel
C&S - communication & systems group
Salzdahlumer Str. 46/48
D-38302 Wolfenbuettel

E-Mail:
info@cs-group.de
LIN@cs-group.de

Phone:
+49 (0) 5331 939-6601
+49 (0) 5331 939-6603

Fax:
+49 (0) 5331 939-6602

Webpage:
http://www.cs-group.de/

LIN conformance:
http://www.cs-group.de/index.php?id=64
2.2 Ihr GmbH

Address:

ihr GmbH
Daimlerstr.17
D-77815 Buehl

E-Mail:

info@ihr.de
joerg.holzberg@ihr.de
ruediger.kewitz@ihr.de

Phone:

+49(0)7223 9964-0

Fax:

+49(0)7223 9964-50

Webpage:

http://www.ihr.de/cms/front_content.php

LIN conformance:

http://www.ihr.de/cms/front_content.php?idcat=45&lang=3
2.3 Micron Electric Devices AG

Address:
Micron Electronic Devices AG
Neugablonzer Str. 13
93073 Neutraubling

E-Mail:
info@micron-ag.com
tcc@micron-ag.com

Phone:
+49 (0) 9401 9309-0

Fax:
+49 (0) 9401 9309-100

Webpage:
http://www.micron-ag.com/start.html (needs Flash Player)

Conformance Tests:
http://www.micron-ag.com/content/leistung/index.htm
2.4 LIN Administration

Address:
LIN Administration
Industriestr. 6
D-70565 Stuttgart

E-Mail:
info@lin-subbus.org

Phone:
+49 (0) 711 220 611-515

Webpage:
http://www.lin-subbus.org/

LIN Compliance: