

TN0946 Technical note

Results of the conformance tests performed on the STM8 LIN software package release 5.1

Introduction

This document describes the tests that were performed on the STM8 LIN software package (STSW-STM8A-LIN) release 5.1 to check the conformance with LIN specification.

Table 1. Applicable software

| Туре | Part number |
|----------|----------------|
| Software | STSW-STM8A-LIN |

Table 2. Reference documents

| Document name | Version |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------|
| LIN conformance test specification for the LIN specification package revision 2.0 (in particular LIN OSI Layer 2 – Data Link Layer) | 1.0 [01/08/2004] |
| LIN specification package revision 2.1 of LIN consortium | 2.1 [24/11/2006] |
| Release note RN0086, "Description of STM8 LIN software package (STSW-STM8A-LIN) release 5.1" | 2.0 |
| LIN specification package revision 2.0 of LIN consortium | 2.0 [18/09/2003] |
| C cross compiler user guide for STM8 (delivered inside the compiler package) | 4.3.9 |
| LIN conformance test specification for LIN specification package 2.1 | 2.1 [10/10/2008] |

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1 Hardware requirements

The following figures and tables illustrate the hardware used and the connections for performing the conformance tests on STM8 LIN package release 5.1.

STM8/128-EVAL board:

- Figure 1 and Table 3 show the hardware connections required on STM8/128-EVAL for testing STM8 LIN package release 5.1 using the UART1 on STM8AF devices for slave and master nodes.
- Figure 2 and Table 4 show the hardware connections required on STM8/128-EVAL for testing STM8 LIN package release 5.1 using UART2 or UART3 on STM8AF devices for slave and master nodes.

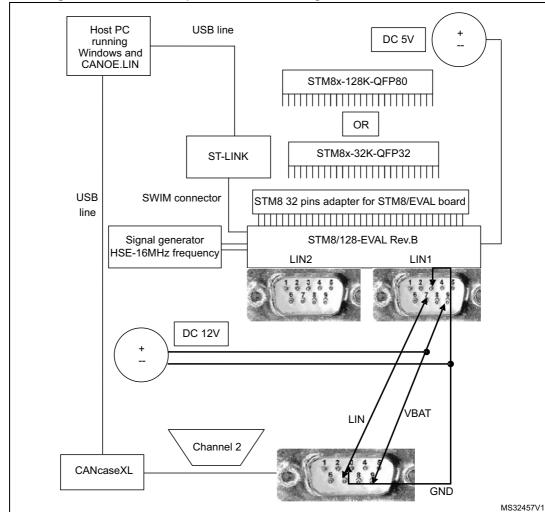


Figure 1. Hardware requirements for testing LIN driver on STM8AF UART1

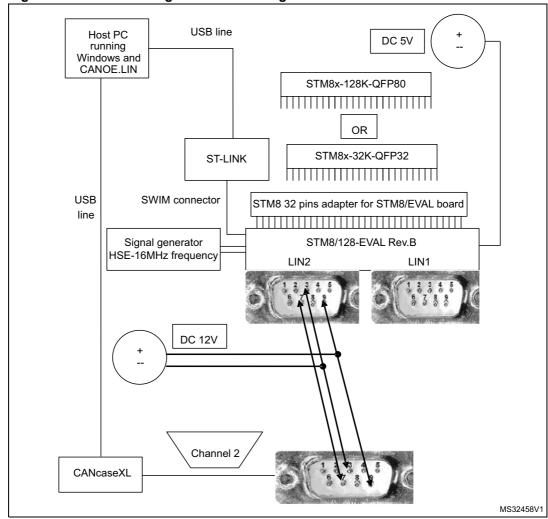


Figure 2. Hardware configuration for testing LIN driver on STM8AF UART2 or UART3

Table 3. Connections between CANcaseXL and STM8/128-EVAL rev. B board for testing STM8 LIN package V5.1 on UART1

| STM8/128-EVAL rev. B CANcaseXL | | Node tested | | |
|-----------------------------------------|------------------------------|----------------|--|--|
| USART/UART1 - LIN_SCI2 serial interface | | | | |
| LIN1 RS232 PIN 3 (GND) | Channel 2 RS232 PIN 3 (GND) | Master / Slave | | |
| LIN1 RS232 PIN 7 (LIN) | Channel 2 RS232 PIN 7 (LIN) | Master / Slave | | |
| LIN1 RS232 PIN 9 (VBAT) | Channel 2 RS232 PIN 9 (VBAT) | Master / Slave | | |

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Table 4. Connections between CANcaseXL and STM8/128-EVAL rev. B board for testing STM8 LIN package V5.1 on UART2 or UART3

| STM8/128-EVAL rev. B | CANcaseXL | To use to test with |
|-------------------------|--------------------------------------------|---------------------|
| LINUART/ | UART2 or UART3 - LIN_SCI1 serial interface | |
| LIN2 RS232 PIN 3 (GND) | Channel 2 RS232 PIN 3 (GND) | Master / Slave |
| LIN2 RS232 PIN 7 (LIN) | Channel 2 RS232 PIN 7 (LIN) | Master / Slave |
| LIN2 RS232 PIN 9 (VBAT) | Channel 2 RS232 PIN 9 (VBAT) | Master / Slave |

Table 5. Connections between signal generator and STM8/128-EVAL board rev. B

| Signal Generator | Phytec Minimodule | Note |
|------------------|-------------------|-------|
| HSE SIGNAL | PA1 | OSCIN |
| GND | Every ground | |

Table 6. Jumper settings for STM8/128-EVAL board rev. B

| Jumper location Jumper name | | Description | | | |
|---------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| STM8/128-EVAL rev. B | JP3 (1+2) and (3+4) shorted | Power connector/daughter board jumper | | | |
| STM8/128-EVAL rev. B CN1 pin 10 shorted with CN1 pin 12 | | CN1 pin 10 == PG6 CN1 pin 12 == GND PG6 shorted to GND redirects LINUART/UART2 or UART3 TX/RX signals (LIN_MULTIPLEXER_1) to LIN2 port connector (CN14 DB9-male LIN2). | | | |
| STM8/128-EVAL rev. B | CN1 pin 22 shorted with CN1 pin 49 | CN1 pin 22 == PG3 CN1 pin 49 == D5V PG3 shorted to D5V enables LIN_EN_2 signal to enable LIN2 transceiver on LIN2 port connector (CN14 DB9-male LIN2). | | | |
| STM8/128-EVAL rev. B | CN1 pin 22 shorted with CN1 pin 49 | CN1 pin 34 == PC2 CN1 pin 36 == PC0 PC0 is connected to the button present on the evaluation board. When using the 32-pin adapter, PC2 must be shorted to PC0. This button is needed to test the events. | | | |
| STM8/128-EVAL rev. B | CN5 pin 19 shorted with CN5 pin 28 | CN5 pin 19 == D5V CN5 pin 28 == PF7 PF7 shorted to D5V enables LIN_EN_1 signal to enable LIN1 transceiver on LIN1 port connector (CN11 DB9-male LIN1). | | | |
| STM8/128-EVAL rev. B | CN5 pin 31 and CN5 pin 29 shorted with CN5 pin 50 | CN5 pin 29 == PF6 CN5 pin 31 == PF5 CN5 pin 50 == GND PF5 and PF6 shorted to GND redirects USART/UART1 TX/RX signals (USART_MULTIPLEXER_1 and USART_MULTIPLEXER_2) to LIN1 port connector (CN11 DB9-male LIN1). | | | |



STM8A-DISCOVERY:

Figure 3 and *Table 7* shows the hardware connections required on the STM8AL board of STM8A-DISCOVERY for testing STM8 LIN package release 5.1 using the USART on the STM8AL device for Slave.

Figure 4 and *Table 7* shows the hardware connections required on the STM8AF board of STM8A-DISCOVERY for testing STM8 LIN package release 5.1 using the LINUART on the STM8AF device for Master.

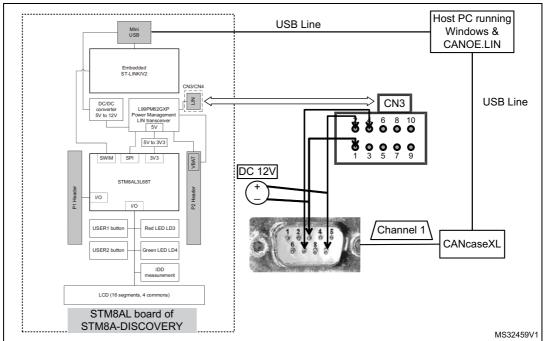
Hardware configuration for testing LIN driver on STM8AF board of STM8A-DISCOVERY

Table 7. Connections between CANcaseXL and STM8AL or STM8AF board of STM8A-DISCOVERY for testing STM8 LIN package V5.1 on USART

| STM8A-DISCOVERY (STM8AF/STM8AL board) | CANcaseXL | Node tested |
|----------------------------------------|---------------------|--------------|
| USART - LIN_SC | I1 serial interface | |
| CN3 or CN4 Pin 1 (GND) | Channel 1 Pin 3 | Master/Slave |
| CN3 or CN4 Pin 4 (LIN) | Channel 1 Pin 7 | Master/Slave |
| CN3 or CN4 Pin 2 (VBAT) ⁽¹⁾ | Channel 1 Pin 9 | Master/Slave |

^{1. +12} V must be supplied on STM8A-DISCOVERY CN3 or CN4 Pin 2 (VBAT).

Figure 3. Hardware configuration for testing LIN driver on STM8AL board of STM8A-DISCOVERY



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Host PC running **USB** Line Windows & CANOE.LIN CAN **USB** Line 1 CN4 VBAT P1 Header DC 12V Red LED LD3 Channel 1 Green LED LD4 CANcaseXL USER2 buttor Green LED LD5 Green LED LD6 Green LED LD7 STM8AF board of STM8A-DISCOVERY MS32460V1

Figure 4. Hardware configuration for testing LIN driver on STM8AF board of STM8A-DISCOVERY



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2 Software requirements

Table 8. Software environment

| Item | Note | Version |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| STM8 LIN package | It includes the LIN driver (Master & Slave) for STM8A on UART1, UART2 or UART3 and LIN driver (Slave) for STM8AL on USART | 5.1 ⁽¹⁾ |
| STVD7 | STVD7 ST7 Visual Develop | |
| Compiler | Compiler CXSTM8 COSMIC C compiler | |
| Version 6.0.63 (SP3) has been used to test LIN 2.0 slave conformance while version 7.2.42 (SP1) is used to test the LIN 2.1 slave conformance and the LIN 2.0 master conformance. | | 7.2.42 (SP1) or 6.0.63 (SP3) |
| Lingen | Application allowing to generate lin_cfg.c, lin_cfg.h and lin_cfg_types.h files. | 3.5.0.STM |

Some compiler optimizations have been done in demo → stm8_128-eval → slave for STM8AF6223 and STM8AF6226T devices.



3 Tested configurations

The following configuration has been tested to verify the conformance of the STM8AF52AA microcontroller with LIN 2.0 master and LIN 2.x slave:

- LIN 2.0 conformance for master node
- LIN 2.0 and LIN 2.1 conformance for slave node
- UART1 (only for master node) and UART2 or UART3 (master and slave)
- Baudrate: 2400, 9600, 10417, 19200, 20000 bps
- Clock: 16 MHz external clock (quartz) for master node, 16 MHz internal RC oscillator (for slave node)
- Autosync (only for UART2 or UART3 slave nodes): enabled
- 128-Kbyte STM8AF52AA microcontroller in LQFP80 package.

The following configuration has been tested to verify the conformance of the STM8AL microcontroller with LIN 2.x slave:

- LIN 2.0 and LIN 2.1 conformance for slave node
- USART (for slave node)
- Baudrate: 2400, 9600, 10417, 19200, 20000 bps
- Clock: 16 MHz external clock (quartz)
- 32-Kbyte STM8AL microcontroller in LQFP 48 pin package.

The following configuration has been tested to verify the conformance of the STM8AF6226 microcontroller with Lin 2.0 & 2.1 slave:

- LIN 2.0 and LIN 2.1 conformance for slave node
- LINUART (for slave node)
- Baudrate: 2400, 9600, 10417, 19200, 20000 bps
- Clock: 16 MHz Internal RC oscillator
- 8 Kbyte STM8AF6226T microcontroller (in LQFP32 package).

4 Results of LIN 2.0 slave conformance tests

The following tables give the results of the tests performed on STM8AF LINUART and STM8AL USART.

4.1 LIN 2.0 slave – LIN OSI layer 2 – data link layer

Table 9. LIN 2.0 slave test list: LIN OSI layer 2 – data link layer

| | Table 3. Lift 2.0 Slave test list. Lift OSI layer 2 - data lift layer | | | | | | |
|--------|-----------------------------------------------------------------------|-------|------------------------|-------|------|------|---------|
| TC | Name | | Baudrate / Test status | | | | Comment |
| ref. | Name | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 2 | Timing parameters | | | | | | |
| 2.2.1 | Variation of length of SYNCH BREAK LOW PHASE | PASS | PASS | PASS | PASS | PASS | |
| 2.2.2 | Variation of length of SYNCH BREAK LOW PHASE | PASS | PASS | PASS | PASS | PASS | |
| 2.2.3 | Variation of length of SYNCH BREAK LOW PHASE | PASS | PASS | PASS | PASS | PASS | |
| 2.4.1 | Variation of length of SYNCH BREAK DELIMITER | PASS | PASS | PASS | PASS | PASS | |
| 2.4.2 | Variation of length of SYNCH BREAK DELIMITER | PASS | PASS | PASS | PASS | PASS | |
| 2.4.3 | Variation of length of SYNCH BREAK DELIMITER | PASS | PASS | PASS | PASS | PASS | |
| 2.6.1 | Variation of length of Header | PASS | PASS | PASS | PASS | PASS | |
| 2.6.2 | Variation of length of Header | PASS | PASS | PASS | PASS | PASS | |
| 2.6.3 | Variation of length of Header | PASS | PASS | PASS | PASS | PASS | |
| 2.6.4 | Variation of length of Header | PASS | PASS | PASS | PASS | PASS | |
| 2.8 | Oscillator tolerance without making use of Synchronization | PASS | PASS | PASS | PASS | PASS | |
| 2.9 | Oscillator tolerance with making use of Synchronization | PASS | PASS | PASS | PASS | PASS | |
| 2.10 | Length of Frame, IUT as Slave answering to a Master request | PASS | PASS | PASS | PASS | PASS | |
| 2.10.1 | IUT as Slave | PASS | PASS | PASS | PASS | PASS | |

Table 9. LIN 2.0 slave test list: LIN OSI layer 2 – data link layer (continued)

| тс | Name | | Baudr | ate / Test | status | | Comment |
|--------|-----------------------------------------------------|------|-------|------------|--------|------|----------------------------------------------------------------------------------------|
| ref. | Namo | | 19200 | 10417 | 9600 | 2400 | Comment |
| 3 | Communication without failure | | | | | | |
| 3.1 | Variation of LIN Identifier | PASS | PASS | PASS | PASS | PASS | |
| 3.1.2 | IUT as Slave | PASS | PASS | PASS | PASS | PASS | |
| 3.2 | Transmission of the Checksum Byte | PASS | PASS | PASS | PASS | PASS | |
| 3.2.1 | IUT as Slave | PASS | PASS | PASS | PASS | PASS | |
| 3.3 | Extended Frame, Reserved | PASS | PASS | PASS | PASS | PASS | |
| 3.5 | Command Frame 'Master Request' | PASS | PASS | PASS | PASS | PASS | |
| 3.7 | Command Frame 'Slave Response Frame' | PASS | PASS | PASS | PASS | PASS | |
| 3.8 | Supported Frames according to the IUT specification | PASS | PASS | PASS | PASS | PASS | |
| 4 | Communication with failure | | | | | | |
| 4.1.1 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.2 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 1-2 with Bit 1 inverted – Not Applicable |
| 4.1.3 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.4 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.5 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 2-3 with Bit 1 inverted – Not Applicable |
| 4.1.6 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.7 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.8 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 3-4 with Bit 1 inverted – Not Applicable |
| 4.1.9 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.10 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Data Byte 4, with Bit 4 inverted - Dominant bit inversion (not applicable) |

Table 9. LIN 2.0 slave test list: LIN OSI layer 2 – data link layer (continued)

| тс | Name | | Baudr | ate / Test | status | | Comment |
|--------|------------------------|-------|-------|------------|--------|------|----------------------------------------------------------------------|
| ref. | Name | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 4.1.11 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 4-5 with Bit 1 inverted – Not Applicable |
| 4.1.12 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.13 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.14 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 5-6 with Bit 1 inverted – Not Applicable |
| 4.1.15 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.16 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.17 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 6-7 with Bit 1 inverted – Not Applicable |
| 4.1.18 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.19 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.20 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 7-8 with Bit 1 inverted – Not Applicable |
| 4.1.21 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.22 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.1.23 | Bit Error | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 8-CS with Bit 1 inverted – Not Applicable |
| 4.1.24 | Bit Error | PASS | PASS | PASS | PASS | PASS | |
| 4.2 | Checksum Error | PASS | PASS | PASS | PASS | PASS | |
| 5 | Event triggered frames | | | | | | |
| 5.1.1 | Without trigger event | PASS | PASS | PASS | PASS | PASS | |
| 5.1.2 | With trigger event | PASS | PASS | PASS | PASS | PASS | |



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4.2 LIN 2.0 slave – node configuration / network management

Table 10. LIN 2.0 slave test list: node configuration / network management

| TC ref. | Name | | Baudr | ate / Test | status | | Comment |
|---------|-----------------------------------------------|-------|-------|------------|--------|------|-----------------------------------|
| ic iei. | Name | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 2 | Status management | | | | | | |
| 2.1 | Error in Received frame | PASS | PASS | PASS | PASS | PASS | |
| 2.2 | Error in Transmitted frame | PASS | PASS | PASS | PASS | PASS | |
| 2.3 | Error in Transmitted frame with collision | PASS | PASS | PASS | PASS | PASS | |
| 3 | Sleep / wakeup tests | | | | | | |
| 3.2 | Receive Command Frame 'Sleep Mode Command' | PASS | PASS | PASS | PASS | PASS | |
| 3.4 | Receive a Wake Up request | PASS | PASS | PASS | PASS | PASS | |
| 3.5 | Send a Wake up request | PASS | PASS | PASS | PASS | PASS | |
| 3.5.1 | IUT as Slave | PASS | PASS | PASS | PASS | PASS | |
| 3.5.2 | No Following Frame Header from a master | PASS | PASS | PASS | PASS | PASS | Where LIN_WAKEUP_RETRIES_MAX is 3 |
| 3.5.3 | Frame Header from a Master following | PASS | PASS | PASS | PASS | PASS | |
| 3.6 | Sleep Mode after Bus Idle | PASS | PASS | PASS | PASS | PASS | |
| 4 | Node configuration | | | | | | |
| 4.1 | Frame ID Assignment | PASS | PASS | PASS | PASS | PASS | |
| 4.1.1 | With indirect response | PASS | PASS | PASS | PASS | PASS | |
| 4.1.2 | With direct response | PASS | PASS | PASS | PASS | PASS | |
| 4.2 | LIN Product ID | PASS | PASS | PASS | PASS | PASS | |
| 4.2.1 | With direct response | PASS | PASS | PASS | PASS | PASS | |

Table 10. LIN 2.0 slave test list: node configuration / network management (continued)

| TO f | Name | | Baudr | ate / Test | status | | • |
|-------------|----------------------------------|-------|-------|------------|--------|------|---------|
| TC ref. | | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 4.2.2 | With indirect response | PASS | PASS | PASS | PASS | PASS | |
| 4.3 | Read by Identifier Command | PASS | PASS | PASS | PASS | PASS | |
| 4.3.1 | With correct NAD | PASS | PASS | PASS | PASS | PASS | |
| 4.3.2 | With incorrect NAD | PASS | PASS | PASS | PASS | PASS | |
| 4.3.2.1 | With incorrect NAD | PASS | PASS | PASS | PASS | PASS | |
| 4.3.3.1 | With incorrect Supplier ID | PASS | PASS | PASS | PASS | PASS | |
| 4.3.4.1 | With incorrect Function ID | PASS | PASS | PASS | PASS | PASS | |
| 4.4 | NAD Assignment | PASS | PASS | PASS | PASS | PASS | |
| 4.4.1 | Followed by "Read by Identifier" | PASS | PASS | PASS | PASS | PASS | |
| 4.4.2 | With positive response | PASS | PASS | PASS | PASS | PASS | |
| 4.4.3 | Conditional change NAD | PASS | PASS | PASS | PASS | PASS | |





5 Results of LIN 2.0 master conformance tests

The following tables give the results of the tests performed on STM8AF UART1.

5.1 LIN 2.0 master – LIN OSI layer 2 – data link layer

Table 11. Master test list: LIN OSI layer 2 - data link layer

| тс | Name | | Baud | drate / Tes | st status | | Comment |
|--------|--------------------------------------|-------|-------|-------------|-----------|------|--------------------|
| ref. | | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 2 | Timing parameters | | | | | | |
| 2.1 | Length of SYNCH BREAK LOW PHASE | PASS | PASS | PASS | PASS | PASS | |
| 2.3 | Length of SYNCH BREAK DELIMITER | PASS | PASS | PASS | PASS | PASS | See ⁽¹⁾ |
| 2.5 | Length of Header | PASS | PASS | PASS | PASS | PASS | |
| 2.7 | Oscillator tolerance | PASS | PASS | PASS | PASS | PASS | |
| 2.10 | Length of frame | PASS | PASS | PASS | PASS | PASS | |
| 2.10.2 | IUT as Master with a slave task | PASS | PASS | PASS | PASS | PASS | |
| | | | | | | | |
| 3 | Communication without failure | | | | | | |
| 3.1 | Variation of LIN Identifier | PASS | PASS | PASS | PASS | PASS | |
| 3.1.1 | IUT as Master | PASS | PASS | PASS | PASS | PASS | |
| 3.1.3 | IUT as Master with Slave task | PASS | PASS | PASS | PASS | PASS | |
| 3.2 | Transmission of the Checksum Byte | PASS | PASS | PASS | PASS | PASS | |
| 3.2.2 | IUT as Master with a slave task | PASS | PASS | PASS | PASS | PASS | |

Table 11. Master test list: LIN OSI layer 2 - data link layer (continued)

| TC | Name | | Baud | drate / Tes | st status | | Comment |
|------|--------------------------------------|-------|-------|-------------|-----------|------|---------|
| ref. | Name | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 3.4 | Command Frame 'Master Request' | PASS | PASS | PASS | PASS | PASS | |
| 3.6 | Command Frame 'Slave Response Frame' | PASS | PASS | PASS | PASS | PASS | |

^{1.} For baudrate 10417 and 2400 bps, CANOE software considers this test as failed, and outputs the following messages:

LIN 2.0 master - node configuration / network management 5.2

Table 12 Master test list: node configuration/network management

| | 1 | ork management | | | | | |
|---------|--------------------------------------------|----------------|-------|------------|--------|------|---------|
| TC ref. | Name | | Baudr | ate / Test | status | | Comment |
| TO Tel. | | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 3 | Sleep / wakeup tests | | | | | | |
| 3.1 | Send Command Frame 'Sleep Mode Command' | PASS | PASS | PASS | PASS | PASS | |
| 3.3 | Receive a Wake Up request | PASS | PASS | PASS | PASS | PASS | |
| 3.5 | Send a Wake up request | PASS | PASS | PASS | PASS | PASS | |
| 3.5.1 | IUT as Master with slave task | PASS | PASS | PASS | PASS | PASS | |



For baudrate 10417 and 2400 bps, CANOE software considers this test as failed, and outputs the following messages:

"T[syndel] measured is not in the allowed range [>=420]. T[syndel] measured = 410 (in μs)" (for 2400 bps);

"T[syndel] measured is not in the allowed range [>=100]. T[syndel] measured = 90 (in μs)" (for 10417 bps).

However, when measuring with an oscilloscope the duration between two consecutive bits of the synch byte 0x55 of a Master node transmitted frame, we can see that:

- at 2400 bps, duration = 835 μs à the average bit length is 835/2 = 417.5 μs (expected value should be 1/2400 = 416 μs);

- at 10417 bps, duration = 192.2 μs à the average bit length is 192.2/2 = 96.1 μs (expected value should be 1/10417= 95.96 μs).

As a results, despite what CANOE reports, this test is considered as passed.



Results of LIN 2.1 slave conformance tests 6

The following tables give the results of the tests performed on STM8AF LINUART and STM8AL USART.

LIN 2.1 slave – LIN OSI layer 2 – data link layer 6.1

Table 13. LIN 2.1 slave test List: LIN OSI layer 2 – data link layer

| | Name | | Baudr | ate / Test | status | | |
|---------|---------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|---------------|---------------|---------------|-----------------------|
| TC ref. | | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 2 | Essential test cases before test start | | | | | | |
| 2.1 | Diagnostic frame 'Master Request' | PASS | PASS | PASS | PASS | PASS | |
| 2.2 | Command Frame 'Slave Response Frame' | PASS | PASS | PASS | PASS | PASS | |
| 2.3 | Error in Received Frame | PASS | PASS | PASS | PASS | PASS | |
| 3 | Timing parameters | | | | | | |
| 3.2 | Variation of Length of break field low phase | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 3.4.1 | Variation of Length of break delimiter. Sync Break = 13 bit (min), Sync Delimiter = 1 bit (min), Interbyte = 0 bit (min) | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 3.4.2 | Variation of Length of break delimiter. Sync Break = 13 bit (min), Sync Delimiter = 14 bit (max), Interbyte = 0 bit (min) | PASS | PASS | PASS | PASS | PASS | |
| 3.4.3 | Variation of Length of break delimiter. Sync Break = 13 bit (min), Sync Delimiter = 10 bit, Interbyte = 0 bit (min) | PASS | PASS | PASS | PASS | PASS | |
| 3.5 | Inconsistent break field error | PASS | PASS | PASS | PASS | PASS | |
| 3.6.1 | Inconsistent Sync Byte Field error. Sync Byte Field = 0x54 | PASS | PASS | PASS | PASS | FAIL | CANOE internal error! |

Table 13. LIN 2.1 slave test List: LIN OSI layer 2 – data link layer (continued)

| TC ref. | Name | | Baudı | ate / Test | status | | Comment |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|---------------|---------------|---------------|---------|
| To lei. | Name | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 3.6.2 | Inconsistent Sync Byte Field error. Sync Byte Field = 0x5D | PASS | PASS | PASS | PASS | PASS | |
| 3.8.1 | Incomplete frame reception. Break field only | PASS | PASS | PASS | PASS | PASS | |
| 3.8.2 | Incomplete frame reception. Break and Sync Byte fields only | PASS | PASS | PASS | PASS | PASS | |
| 3.8.3 | Incomplete frame reception. Header of Rx-frame only | PASS | PASS | PASS | PASS | PASS | |
| 3.8.4 | Incomplete frame reception. Header of Rx-frame with the first data byte only | PASS | PASS | PASS | PASS | PASS | |
| 3.9.1 | Unknown frame reception. Header of unknown frame only | PASS | PASS | PASS | PASS | PASS | |
| 3.9.2 | Unknown frame reception. Header of unknown frame with the first data byte only | PASS | PASS | PASS | PASS | PASS | |
| 3.9.3 | Unknown frame reception. Unknown frame with wrong checksum | PASS | PASS | PASS | PASS | PASS | |
| 3.11.1 | Variation of header length. Header = 34 bit; Sync Break = 13 bit (min), Sync Del = 1 bit (min), Interbyte = 0 bit, minimum bit rate | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 3.11.2 | Variation of header length. Header = 47 bit; Sync Break = 19 bit, Sync Del = 2 bit, Interbyte = 6 bit, maximum bit rate | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 3.11.3 | Variation of header length. Header = 40 bit; Sync Break = 15 bit, Sync Del = 3 bit, Interbyte = 2 bit, nominal bit rate | PASS | PASS | PASS | PASS | PASS | |
| 3.11.4 | Variation of header length. Header = 47 bit; Sync Break = 13 bit (min), Sync Del = 1 bit (min), Interbyte = 13 bit, maximum bit rate | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |





Table 13. LIN 2.1 slave test List: LIN OSI layer 2 – data link layer (continued)

| TC ref. | Name | | Baudı | ate / Test | status | | Comment |
|----------|----------------------------------------------------------------------------------------------------------------|---------------|---------------|---------------|---------------|---------------|---------|
| i Ciei. | Name | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 3.13.1 | Bit rate tolerance, IUT without making use of synchronization. Master deviation from nominal bit rate = + 0.5% | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 3.13.2 | Bit rate tolerance, IUT without making use of synchronization. Master deviation from nominal bit rate = - 0.5% | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 3.14.1 | Bit rate tolerance, IUT with making use of synchronization. Master deviation from nominal bit rate = + 0.5% | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 3.14.2 | Bit rate tolerance, IUT with making use of synchronization. Master deviation from nominal bit rate = - 0.5% | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 3.15.1 | Length of response | PASS | PASS | PASS | PASS | PASS | |
| 3.15.3.1 | Acceptance of response field. Response space = 0 bits, each inter-byte space = 0 bits | PASS | PASS | PASS | PASS | PASS | |
| 3.15.3.2 | Acceptance of response field. Response space = 4 bits, each inter-byte space = 4 bits | PASS | PASS | PASS | PASS | PASS | |
| 3.15.3.3 | Acceptance of response field. Response space = 0 bits, inter-byte space between data bytes 7 and 8 = 36 bits | PASS | PASS | PASS | PASS | PASS | |
| 3.15.3.4 | Acceptance of response field. Response space = 36 bits, each inter-byte space = 0 bits | PASS | PASS | PASS | PASS | PASS | |
| 3.17 | Sample Point Test | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 4 | Communication without failure | | | | | | |
| 4.1.2 | Variation of LIN Identifier of subscribed frames | PASS | PASS | PASS | PASS | PASS | |
| 4.1.3 | Variation of LIN Identifier of published frames | PASS | PASS | PASS | PASS | PASS | |

Table 13. LIN 2.1 slave test List: LIN OSI layer 2 – data link layer (continued)

| TC ref. | Nome | | Baudr | ate / Test | status | | Comment |
|----------|--------------------------------------------------------|-------|-------|------------|--------|------|---------------------------------------------------------------------|
| i C ret. | Name | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 4.2.1 | Transmission of the Checksum Byte classic checksum | PASS | PASS | PASS | PASS | PASS | |
| 4.2.2 | Transmission of the Checksum Byte enhanced checksum | PASS | PASS | PASS | PASS | PASS | |
| 4.3.2 | Unused bits | PASS | PASS | PASS | PASS | PASS | |
| 4.4.1 | Reserved Frame | PASS | PASS | PASS | PASS | PASS | |
| 4.4.2 | Reserved Frame with error | PASS | PASS | PASS | PASS | PASS | |
| 4.6.1 | Supported Tx Frames according to the IUT specification | PASS | PASS | PASS | PASS | PASS | |
| 4.6.2 | Supported Rx Frames according to the IUT specification | PASS | PASS | PASS | PASS | PASS | |
| 5 | Communication with failure | | | | | | |
| 5.1.1 | Bit error. Byte 1, Stop bit | PASS | PASS | PASS | PASS | PASS | |
| 5.1.2 | Bit error. Byte 1, Bit 1 | PASS | PASS | PASS | PASS | PASS | |
| 5.1.3 | Bit error. Interbyte Data 1-2, Bit 1 | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 1-2 with Bit 1 inverted – Not Applicable |
| 5.1.4 | Bit error. Byte 2, Stop bit | PASS | PASS | PASS | PASS | PASS | |
| 5.1.5 | Bit error. Byte 2, Bit 2 | PASS | PASS | PASS | PASS | PASS | |
| 5.1.6 | Bit error. Interbyte Data 2-3, Bit 1 | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 2-3 with Bit 1 inverted – Not Applicable |
| 5.1.7 | Bit error. Byte 3, Stop bit | PASS | PASS | PASS | PASS | PASS | |
| 5.1.8 | Bit error. Byte 3, Bit 3 | PASS | PASS | PASS | PASS | PASS | |
| 5.1.9 | Bit error. Interbyte Data 3-4, Bit 1 | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 3-4 with Bit 1 inverted – Not Applicable |
| 5.1.10 | Bit error. Byte 4, Stop bit | PASS | PASS | PASS | PASS | PASS | |





Table 13. LIN 2.1 slave test List: LIN OSI layer 2 – data link layer (continued)

| TC mof | Namo | | Baudr | ate / Test | status | | Comment |
|---------|-----------------------------------------------------|-------|-------|------------|--------|------|----------------------------------------------------------------------|
| TC ref. | Name | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 5.1.11 | Bit error. Byte 4, Bit 6 | PASS | PASS | PASS | PASS | PASS | |
| 5.1.12 | Bit error. Interbyte Data 4-5, Bit 1 | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 4-5 with Bit 1 inverted – Not Applicable |
| 5.1.13 | Bit error. Byte 5, Stop bit | PASS | PASS | PASS | PASS | PASS | |
| 5.1.14 | Bit error. Byte 5, Bit 5 | PASS | PASS | PASS | PASS | PASS | |
| 5.1.15 | Bit error. Interbyte Data 5-6, Bit 1 | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 5-6 with Bit 1 inverted – Not Applicable |
| 5.1.16 | Bit error. Byte 6, Stop bit | PASS | PASS | PASS | PASS | PASS | |
| 5.1.17 | Bit error. Byte 6, Bit 4 | PASS | PASS | PASS | PASS | PASS | |
| 5.1.18 | Bit error. Interbyte Data 6-7, Bit 1 | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 6-7 with Bit 1 inverted – Not Applicable |
| 5.1.19 | Bit error. Byte 7, Stop bit | PASS | PASS | PASS | PASS | PASS | |
| 5.1.20 | Bit error. Byte 7, Bit 7 | PASS | PASS | PASS | PASS | PASS | |
| 5.1.21 | Bit error. Interbyte Data 7-8, Bit 1 | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 7-8 with Bit 1 inverted – Not Applicable |
| 5.1.22 | Bit error. Byte 8, Stop bit | PASS | PASS | PASS | PASS | PASS | |
| 5.1.23 | Bit error. Byte 8, Bit 8 | PASS | PASS | PASS | PASS | PASS | |
| 5.1.24 | Bit error. Interbyte Data 8-Checksum, Bit 1 | N.A. | N.A. | N.A. | N.A. | N.A. | Bit Error - Interbyte Data 8-CS with Bit 1 inverted – Not Applicable |
| 5.1.25 | Bit error. Checksum field, Stop bit | PASS | PASS | PASS | PASS | PASS | |
| 5.2 | Framing error in header of published frame | PASS | PASS | PASS | PASS | PASS | |
| 5.3 | Framing error in response field of subscribed frame | PASS | PASS | PASS | PASS | PASS | |
| 5.4 | Checksum error by inversion | PASS | PASS | PASS | PASS | PASS | |
| 5.5 | Checksum error by carry | PASS | PASS | PASS | PASS | PASS | |

Table 13. LIN 2.1 slave test List: LIN OSI layer 2 – data link layer (continued)

| TC ref. | Name | | Baudr | ate / Test | status | Co | |
|----------|----------------------------------------------------------|-------|-------|------------|--------|------|---------|
| i C rei. | | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 6 | Event triggered frames | | | | | | |
| 6.1 | Event Triggered Frame | PASS | PASS | PASS | PASS | PASS | |
| 6.2.1 | Event Triggered Frame with collision resolving | PASS | PASS | PASS | PASS | PASS | |
| 6.2.2 | Event Triggered Frame with errors in collision resolving | PASS | PASS | PASS | PASS | PASS | |
| 6.4 | Error in Transmitted Frame with Collision | PASS | PASS | PASS | PASS | PASS | |

6.2 LIN 2.1 slave – node configuration / network management

Table 14. LIN 2.1 slave test list: node configuration / network management

| | · · · · · · · · · · · · · · · · · · · | | | | | | |
|---------|--------------------------------------------------------------------------|-------|-------|------------|---------|------|---------|
| TC ref. | Name | | Ва | udrate / T | Comment | | |
| | | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 7 | Status management | | | | | | |
| 7.1 | Error in Received frame | PASS | PASS | PASS | PASS | PASS | |
| 7.2.1 | Error in Transmitted frame. Inverted checksum | PASS | PASS | PASS | PASS | PASS | |
| 7.2.2 | Error in Transmitted frame. Inverted stop bit of Byte 1 | PASS | PASS | PASS | PASS | PASS | |
| 7.3 | Response error bit handling | PASS | PASS | PASS | PASS | PASS | |
| 8 | Sleep / wakeup tests | | | | | | |
| 8.2.1 | Receive 'Goto Sleep Command' with data bytes 2 to 8 filled with 0xFF | PASS | PASS | PASS | PASS | PASS | |
| 8.2.2 | Receive 'Goto Sleep Command' with data bytes 2 to 8 not filled with 0xFF | PASS | PASS | PASS | PASS | PASS | |



Table 14. LIN 2.1 slave test list: node configuration / network management (continued)

| TC ref. | Name | | Ва | udrate / T | est status | Comment | |
|---------|-----------------------------------------------------------------------------------|-------|-------|------------|------------|---------|---------------------------------------------------------------------------------------|
| TC ret. | | 20000 | 19200 | 10417 | 9600 | 2400 | - Comment |
| 8.4.1 | Receive a Wake up signal - 250us | PASS | PASS | PASS | PASS | PASS | |
| 8.4.2 | Receive a Wake up signal - 5ms | PASS | PASS | PASS | PASS | PASS | |
| 8.4.3 | Receive a Wake up signal - 5 nominal bit times | PASS | PASS | PASS | PASS | PASS | |
| 8.5.1 | Send a Wake up signal | PASS | PASS | PASS | PASS | PASS | |
| 8.5.2 | Send a block of wake up signals | PASS | PASS | PASS | PASS | PASS | For 2400 bps only, LIN_WAKEUP_TIMEOUT_VAL_SHOR T is set to 153, instead of 150. |
| 8.5.3 | Wait after one block of wakeup signals | PASS | PASS | PASS | PASS | PASS | |
| 8.5.4 | Send a Wake up signal, Frame header from a Master following | PASS | PASS | PASS | PASS | PASS | |
| 8.6.1.1 | Sleep Mode after Bus Idle, recessive level after Slave Response | PASS | PASS | PASS | PASS | PASS | |
| 8.6.1.2 | Sleep Mode after Bus Idle, recessive level after wake up | PASS | PASS | PASS | PASS | PASS | |
| 8.6.1.3 | Sleep Mode after Bus Idle, dominant level after wake up | PASS | PASS | PASS | PASS | PASS | |
| 8.6.1.4 | Sleep Mode after Bus Idle, recessive level after Break and Sync fields | PASS | PASS | PASS | PASS | PASS | |
| 8.6.1.5 | Sleep Mode after Bus Idle, dominant level after Break and Sync fields | PASS | PASS | PASS | PASS | PASS | |
| 8.6.1.6 | Sleep Mode after Bus Idle, recessive level after response error in master request | PASS | PASS | PASS | PASS | PASS | |
| 8.6.1.7 | Sleep Mode after Bus Idle, dominant level after response error in master request | PASS | PASS | PASS | PASS | PASS | |
| 8.6.2 | Sleep Mode after Bus Idle, recessive level after power up wake up | PASS | PASS | PASS | PASS | PASS | |
| 8.7 | Timeout after Bus Idle | PASS | PASS | PASS | PASS | PASS | |

Table 14. LIN 2.1 slave test list: node configuration / network management (continued)

| TC ref. | Name | | Ва | udrate / T | Comment | | |
|----------|---------------------------------------------------------|-------|-------|------------|---------|------|---------|
| i C ret. | | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 9 | Node configuration | | | | | | |
| 9.1.1 | Frame ID range assignment with indirect response | PASS | PASS | PASS | PASS | PASS | |
| 9.1.2 | Frame ID range unassignment with indirect response | PASS | PASS | PASS | PASS | PASS | |
| 9.2.1 | LIN Product ID with direct response | PASS | PASS | PASS | PASS | PASS | |
| 9.2.2 | LIN Product ID with delayed response | PASS | PASS | PASS | PASS | PASS | |
| 10 | Wildcards | | | | | | |
| 10.1.1 | Request with NAD as wildcard | PASS | PASS | PASS | PASS | PASS | |
| 10.1.2 | Request with Supplier ID as wildcard | PASS | PASS | PASS | PASS | PASS | |
| 10.1.3 | Request with Function ID as wildcard | PASS | PASS | PASS | PASS | PASS | |
| 10.1.4 | Request with Supplier ID and Function ID as wildcard | PASS | PASS | PASS | PASS | PASS | |
| 11 | Read by identifier command | | | | | | |
| 11.1 | Correct addressing. All Identifiers | PASS | PASS | PASS | PASS | PASS | |
| 11.2.1 | Incorrect addressing; Incorrect NAD | PASS | PASS | PASS | PASS | PASS | |
| 11.2.2 | Incorrect addressing; Incorrect Supplier ID MSB | PASS | PASS | PASS | PASS | PASS | |
| 11.2.3 | Incorrect addressing; Incorrect Supplier ID LSB | PASS | PASS | PASS | PASS | PASS | |
| 11.2.4 | Incorrect addressing; Incorrect Function ID MSB | PASS | PASS | PASS | PASS | PASS | |
| 11.2.5 | Incorrect addressing; Incorrect Function ID LSB | PASS | PASS | PASS | PASS | PASS | |
| 12 | NAD assignment | | | | | | |
| 12.1 | NAD Assignment - followed by Read by Identifier command | PASS | PASS | PASS | PASS | PASS | |
| 12.2 | NAD Assignment - with positive response | PASS | PASS | PASS | PASS | PASS | |



Table 14. LIN 2.1 slave test list: node configuration / network management (continued)

| TC rof | Name | | Ва | udrate / To | 0 | | |
|---------|---------------------------------------------------------------------------|---------------|---------------|---------------|---------------|------------|---------|
| TC ref. | | 20000 | 19200 | 10417 | 9600 | 2400 | Comment |
| 12.3 | Conditional change NAD | PASS | PASS | PASS | PASS | PASS | |
| 13 | Transport layer | | | | | | |
| 13.1 | Transport layer Functional Request | PASS | PASS | PASS | PASS | PASS | |
| 13.2.1 | Aborting diagnostic communication with new diagnostic request | PASS | PASS | PASS | PASS | PASS | |
| 13.2.2 | Aborting diagnostic communication with corrupted diagnostic request | PASS | PASS | PASS | PASS | PASS | |
| 13.3 | Receiving segmented request as specified | PASS | PASS | PASS | PASS | PASS | |
| 13.4.1 | Receiving segmented request if user frames between request parts | PASS | PASS | PASS | PASS | PASS | |
| 13.4.2 | Receiving segmented request with functional request between request parts | PASS | PASS | PASS | PASS | PASS | |
| 13.5.1 | Ignoring segmented requests after timeout | PASS | PASS | PASS | PASS | PASS | |
| 13.5.2 | Observing Transport Layer timeout | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | NOT TESTED | |
| 13.6 | Ignoring segmented requests with wrong sequence numbering | PASS | PASS | PASS | PASS | PASS | |
| 13.7 | Responding with correct segmented response | PASS | PASS | PASS | PASS | PASS | |
| 13.8.1 | Sending segmented response with user frames between response parts | PASS | PASS | PASS | PASS | PASS | |
| 13.8.2 | Sending segmented response with functional request between response parts | PASS | PASS | PASS | PASS | PASS | |
| 13.9 | Not responding to 0x3D if there is no request before | PASS | PASS | PASS | PASS | PASS | |
| 13.10 | Not responding to 0x3D if the response is already sent | PASS | PASS | PASS | PASS | PASS | |
| 13.11 | Aborting segmented response after timeout | PASS | PASS | PASS | PASS | PASS | |

Revision history TN0946

7 Revision history

Table 15. Document revision history

| Date | Revision | Changes |
|-------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 03-Dec-2012 | 1 | Initial release. |
| 23-Jul-2013 | 2 | Updated Section: Introduction. Updated Section 1: Hardware requirements, including Figure 1, Figure 2, Table 3, Table 4 and Table 7 titles. Added Figure 3 and Figure 4. Updated Table 8: Software environment. Added 3 rd paragraph in Section 3: Tested configurations Updated some part numbers in Section 3: Tested configurations Updated Section 4: Results of LIN 2.0 slave conformance tests introduction. Updated Section 5: Results of LIN 2.0 master conformance tests introduction. Updated Section 6: Results of LIN 2.1 slave conformance tests introduction. |

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