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ENG. SUPV.	DEPT.		Page 1 of 99
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SUBJECT:

VERIFICATION TEST PROCEDURE SPECIFICATION for COMMON I/O DEVICES - Version 1.3

SMART DISTRIBUTED SYSTEM

Verification Test Procedure Specification for Common I/O Devices

Version 1.3

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MICRO SWITCH SPECIFICATION GS 052 108 Issue 5

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REVISION HISTORY

This section lists the current and most recent revisions. See previous issues of this document for additional previous revisions.

DATE	EVENT
April 6, 1999	Issue 5. Replaced "Product Warranty" with "Open Network Specification" – page 9.
January 29, 1999	Issue 4, Version 1.3. New test for standard bus status display indicators (5.3.5). New test for maximum initialization time following bus power cycle (5.3.3.4). New test for reverse bus power (5.3.1.1). Added general specifications for CAN Controller bit timing (Appendix E. and *Reference /9/*). Additional miscellaneous updates corresponding to Physical Layer Version 2.0.
September 15, 1997	Deleted product/attribute specific password test and replaced with generic password test (5.2.1). Modified primitive tag test to allow implementation of a specific product PT when the model specifies an absolute maximum (e.g., character string length) (5.2.1). Allow autobaud and servicing of unsolicited I/O messages in the non-participative system test (5.6.1). Add static test to verify crystal (CAN) is listed on the Critical Parts List (4.3.4). Miscellaneous editorial and other minor corrections.

Table of Contents

Figures

Check Lists

Appendices

Smart Distributed System—An Open Network Specification

Internet Access to Specifications

All Smart Distributed System General Specifications are available for viewing and/or downloading on the World Wide Web:

http://www.honeywell.com/sensing/prodinfo/sds/sdspec.stm

Or to request additional ***Smart Distributed System*** information and/or literature, send E-Mail to:

info@micro.honeywell.com

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SDSCouncil@micro.honeywell.com

1. Introduction

1.1 Purpose

The primary purposes, of this document, are to:

1. Define the ***Smart Distributed System*** Product Verification requirements for *Common I/O Devices*,
2. Define the general Verification Test process,
3. Define the general test plan for ***Smart Distributed System*** product Verification testing, and
4. Define the requirements for ***Smart Distributed System*** Verification Test reporting.

The purpose, of the tests specified in this document, is to provide ***Smart Distributed System*** Partners and customers - independent data to help them determine if their ***Product*** will minimally interoperate with other Partner products in a ***Smart Distributed System*** application. A test report will be published upon completion of the tests. The report will reflect the results of the tests under the conditions specified in this document. When the Product passes all tests, and upon request by the Partner, the Product will be added to the list of Verified Products. Verified Products are listed in the ***Smart Distributed System*** Partners catalog; and the Verification Status Record will be published on the Honeywell, ***Smart Distributed System***, World Wide Web location, under Product Verification Test Results.

1.2 Scope

This document defines the procedures that must be followed in order to verify individual device ***Conformance***, minimum system ***Interoperability***, and minimum product ***Integrity*** of a ***Smart Distributed System Common I/O Device*** Partner Product. Users of this document must be familiar with the other specifications listed in the reference section of this document. The procedures, in this document, cover the product verification process steps which include: model approval, static documentation and product testing, dynamic product testing, basic system testing, and documentation and reporting of the test results. These test procedures are designed to evaluate a Partner Product – both the physical product and the logical device(s) – with respect to the ***Smart Distributed System*** specifications.

1.3 Definition of Terms

Approved Model List — List of Component Model numbers approved by the Model Review Group.

Baseline Issue Number — A Baseline Issue Number identifies all of the Verification Test specification documents, applicable for a particular Verification Test of a Partner Product, by issue number.

Certified Test Agent — A qualified independent Test Entity which has been certified, by Honeywell, for Verification Testing of ***Smart Distributed System*** based products.

Common I/O Device — A "guest" (i.e. not a Control Interface) ***Smart Distributed System*** based I/O Product.

Conformance — Conformance is the compliance of a ***Smart Distributed System*** based product or system to the ***Smart Distributed System*** specifications.

Control Interface — A "host" (i.e. provides bus master service to a group of Common I/O Devices) ***Smart Distributed System*** based Product.

Critical Parts List — A list of qualified Critical Parts by manufacturer and part number for each of the specified Critical Part types. *Reference /9/*

DCT — Device Conformance Tester

Dynamic Tests — Verification Tests involving a Test Product, with bus power applied, either in a ***Smart Distributed System*** application or stand-alone.

Integrity — Integrity is the fully functional cooperative interaction of different ***Smart Distributed System*** based products in a specific application.

Interoperability — Interoperability is the faultfree cooperative communication of different ***Smart Distributed System*** based products on a single ***Smart Distributed System*** network.

Logical Address — The ***Smart Distributed System*** device address as it appears on the bus and at the device interface. Logical Addresses must be within the range of {0 to 125}.

Model Review Group	The Model Review Group is responsible for the formal review/approval of Component Models which are submitted by Partners for review/approval.
Product	A Partner Product which has been submitted to a Test Agent for Verification Testing.
PUT	Product Under Test
Static Tests	Verification Tests involving a Test Product and/or its Product Specification, without any bus power applied to the Product.
Test Product	A Partner Product which has been submitted to a Certified Test Agent for Verification Testing.
User Address	An abstraction of the Logical Address which is commonly utilized by ***Smart Distributed System*** application software. User Addresses (Logical Addresses offset by 1) must be within the range of {1 to 126}.
Verification	Testing designed to measure the Conformance, Interoperability, and/or Integrity level(s) of a ***Smart Distributed System*** based product, with respect to the established standards.

1.4 Forms

Automated Forms

The Developers Toolkit is available to Partners to facilitate ***Smart Distributed System*** Component Model development. It automates the process of inheriting and creating Attributes, Primitive Tags, Actions, and Events.

The first four forms in this document (Appendices A through D) display the required Component Model information.

Manual Forms

The other forms in this document (Appendices F and G) are worksheets for determining Network Data Descriptors and Primitive Tags. These forms are also available to Partners in Microsoft Word 6.0 format.

The Product Model (Appendix E) is the top level form for consolidating the data that characterizes a ***Smart Distributed System*** based Product.

Form Name	
Network Data Descriptor Information Form	Appendix A
Primitive Tag Information Form	Appendix B
Action Information Form	Appendix C
Event Information Form	Appendix D
Product Model Form	Appendix E
Network Data Descriptor Worksheet	Appendix F
Primitive Tag Worksheet	Appendix G

Figure 1. Manual Forms

1.5 Reference Documents

/1/ Bosch V2.0 CAN Specification, Sept. 1991.
/2/ ISO 7498-1984, Information Processing Systems, Open Systems Interconnection, Basic Reference Model.
/3/ Honeywell, MICRO SWITCH GS 052 103, Honeywell Smart Distributed System Application Layer Protocol.
/4/ Honeywell, MICRO SWITCH GS 052 104, Honeywell Smart Distributed System Physical Layer Specification.
/5/ Honeywell, MICRO SWITCH GS 052 105, Honeywell Smart Distributed System Component Interface Specification.
/6/ Honeywell, MICRO SWITCH GS 052 106, Honeywell Smart Distributed System Control Interface Specification.
/7/ Honeywell, MICRO SWITCH GS 052 107, Honeywell Smart Distributed System Component Modeling Specification.
/8/ IEC 61000-4-4, Electromagnetic Compatibility - Part 4, Testing and measuring techniques. Section 4: Electrical fast transient/burst immunity test.
/9/ Honeywell, MICRO SWITCH GS 052 118, Honeywell Smart Distributed System Critical Parts List.

International Standards can be purchased from the originating body or from a distributor such as Global (see below). The various manufacturer's documents are available from the respective companies. The following is a partial list of suppliers.

American National Standards Institute (ANSI)	212-642-4900
Global Engineering Documents	http://global.his.com
Honeywell, MICRO SWITCH	815-235-5940
Robert Bosch Corporation	708-865-5200

2. Verification Process Description

Smart Distributed System Product ***Verification*** is a thorough and rigorous process designed to assure accurate device implementations, straightforward application integration, and reliable interoperation of "multi-supplier" ***Products***. The following Verification requirements help us accomplish these objectives.

As mentioned previously, the scope of this document is the Verification Process for ***Common I/O Devices*** - one of several model groups (Figure 3). All Partner Product component models must be approved prior to testing. Product documentation along with any necessary test fixturing must also be submitted, along with the Product, prior to testing.

This document covers the minimum set of Verification requirements, which apply to all Common I/O Partner Products. These basic requirements include both individual Device ***Conformance*** testing, minimal System ***Interoperability*** testing, and limited ***Integrity*** testing.

Upon successful completion of these requirements, the Partner is awarded ***Smart Distributed System*** Verification status for the Product(s) tested for a period of three years.

A public Verification Status Record is established, upon request from the Partner, for each verified ***Smart Distributed System*** product. It displays the Partner product listings and other related Verification information.

2.1 Verification Roadmap

Figure 2. Basic Verification Integration Levels, graphically displays the ***Smart Distributed System Verification*** Testing philosophy of system assurance. ***Conformance*** has the highest Verification Integration Level, and normally applies to the ***Product*** alone. At the next level, ***Interoperability***, involves the network communication channel. And at the lowest integration level, ***Integrity*** includes full communication and product functionality in a ***Smart Distributed System*** network. Basic Device Conformance testing is specified for nearly 100% coverage, while System Interoperability and Integrity are specified for minimal coverage. The reasons for this distribution include the following: 1) when all devices conform to all ***Smart Distributed System*** requirements, the majority of network problems are prevented, 2) 100% Interoperability and/or Integrity testing would be very expensive and very difficult - if even possible, 3) basic Interoperability testing ensures that a Partner Product will properly interoperate with some common devices, and 4) Integrity testing includes only EMI Immunity to provide a minimum baseline for product and system robustness.

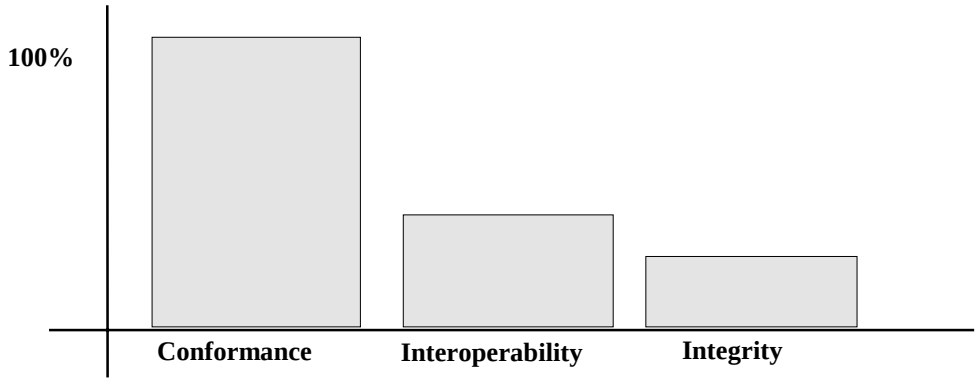


Figure 2. Basic Verification Integration Levels

Verification Testing will be available for all ***Smart Distributed System*** Common I/O Devices through an independent ***Certified Test Agent***. The Basic Verification Test Procedure Specification, for each product group, will involve a suitable mix of the Verification dimensions - Conformance, Interoperability, and Integrity (see section 1.3 for the definitions of these terms).

Because the mapping of Verification dimensions to Verification Testing boundaries is irregular, Figure 3 provides a more useful **roadmap** for ***Smart Distributed System*** Verification Testing. The roadmap integrates the three Verification dimensions into a standard test structure for each model group. Each Product Verification Test includes both ***Static Tests*** and ***Dynamic Tests***. Static Tests involve the Product Documentation and/or the Product, but without any bus power applied. Dynamic Tests involve the ***Test Product*** with bus power applied, either in a ***Smart Distributed System*** application or stand-alone. Both Static and Dynamic Tests are applied to the Component Model, Physical Layer, Data Link Layer, Application Layer, and System Level.

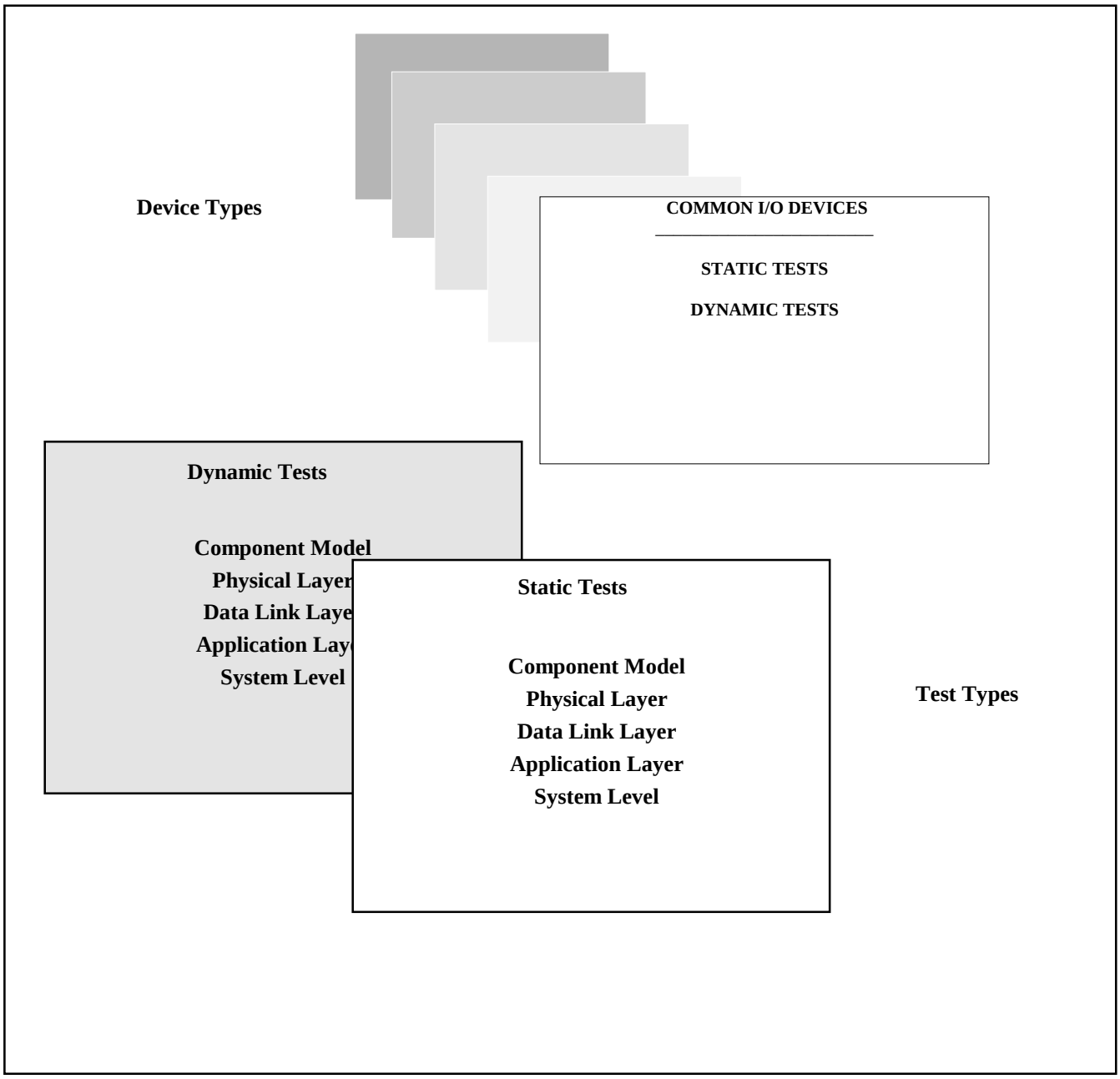


Figure 3. Verification Roadmap

2.2 Verification Requirements - Partner

By initiation and completion of Product ***Verification*** testing, the Partner, who is responsible for the ***Product***, fully subscribes to the following agreement of support and cooperation to help establish and maintain the ***Smart Distributed System*** product group and customer applications at the highest level of reliability and excellence.

Partner Verification Agreement

"Whenever one of our verified products is found to have any conformance/interoperability deficiency, we - the supplier of that product - agree to correct the deficiency, within 90 days, after it is brought to our attention. We also agree to modify any of our verified products, if necessary, to resolve an interoperability problem. We understand that failure to fulfill these requirements could result in the loss of our Product Verification status for the product(s) in question."

2.3 Verification Requirements - Product

The basic ***Verification*** requirements set for ***Smart Distributed System*** Partner ***Products*** are confirmed via ***Static*** and ***Dynamic Tests***. These basic requirements test groups include device level ***Conformance*** testing, limited ***Interoperability*** testing, and minimal environmental testing (EMI). The complete set of requirement tests, for ***Common I/O Devices***, is listed in Figure 4.

	Basic Element	**Verification Specifications**
Test Product	Model	Paragraphs 4.2, 5.2
	Physical Layer	Paragraphs 4.3, 5.3
	Data Link Layer	Paragraphs 4.4, 5.4
	Application Layer	Paragraphs 4.5, 5.5
Test System	System	Paragraph 5.6

Figure 4. Basic Verification Requirement Tests

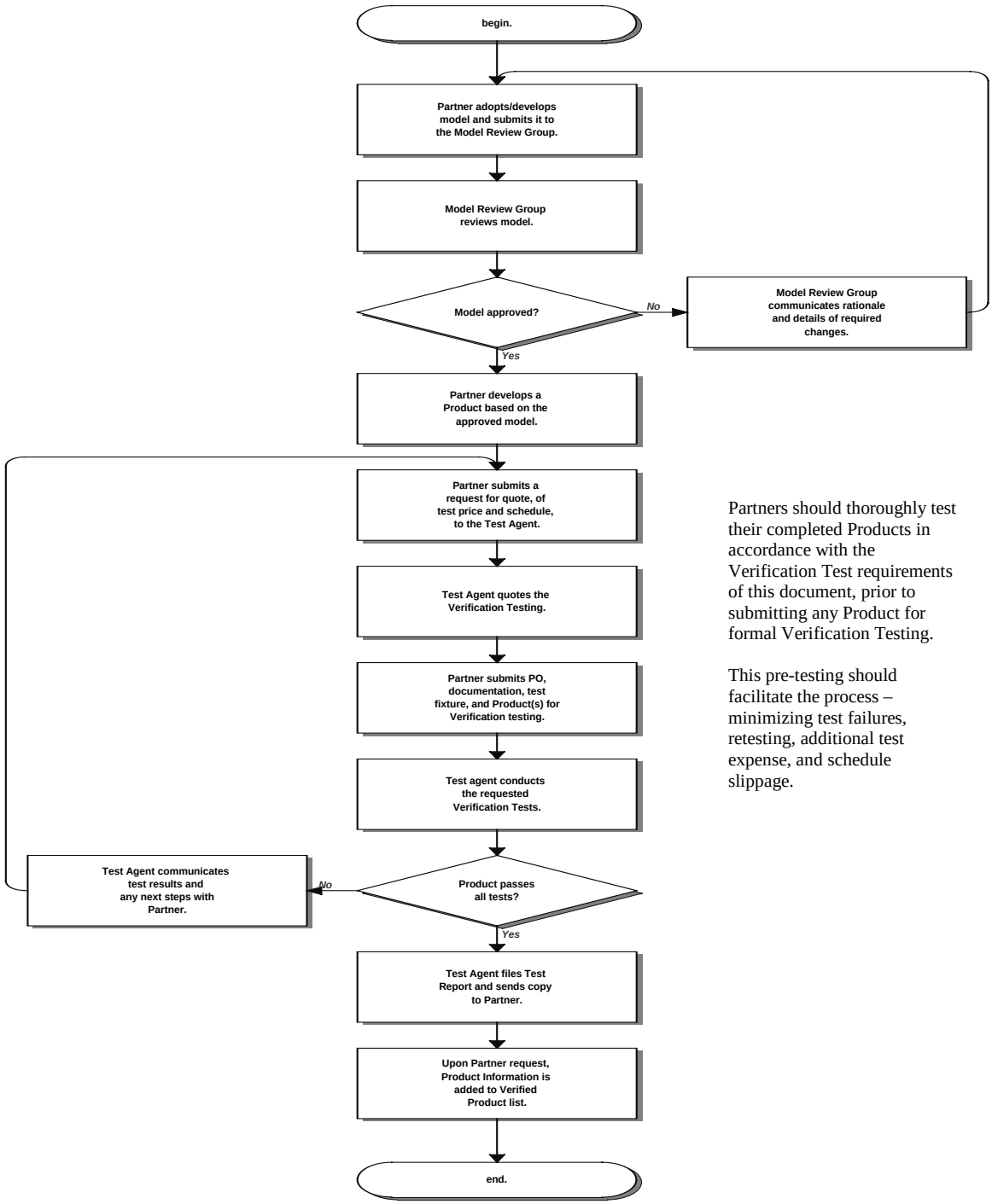
Environment	Requirement
EMI Immunity	IEC 61000-4-4 (previously IEC 801-4 Level 2)

Figure 5. Basic Verification Environmental Requirements

2.4 Verification Requirements - Process

The following flow charts provide several views of the Verification process. The paragraphs following the flow charts describe some of the key process elements.

The following flow diagram shows an overview of the ***Product Verification*** Procedure:



Partners should thoroughly test their completed Products in accordance with the Verification Test requirements of this document, prior to submitting any Product for formal Verification Testing.

This pre-testing should facilitate the process – minimizing test failures, retesting, additional test expense, and schedule slippage.

Figure 6. Verification Process Flow - Overall

The following flow diagram shows the various ***Product Verification*** test scenarios for product family members.

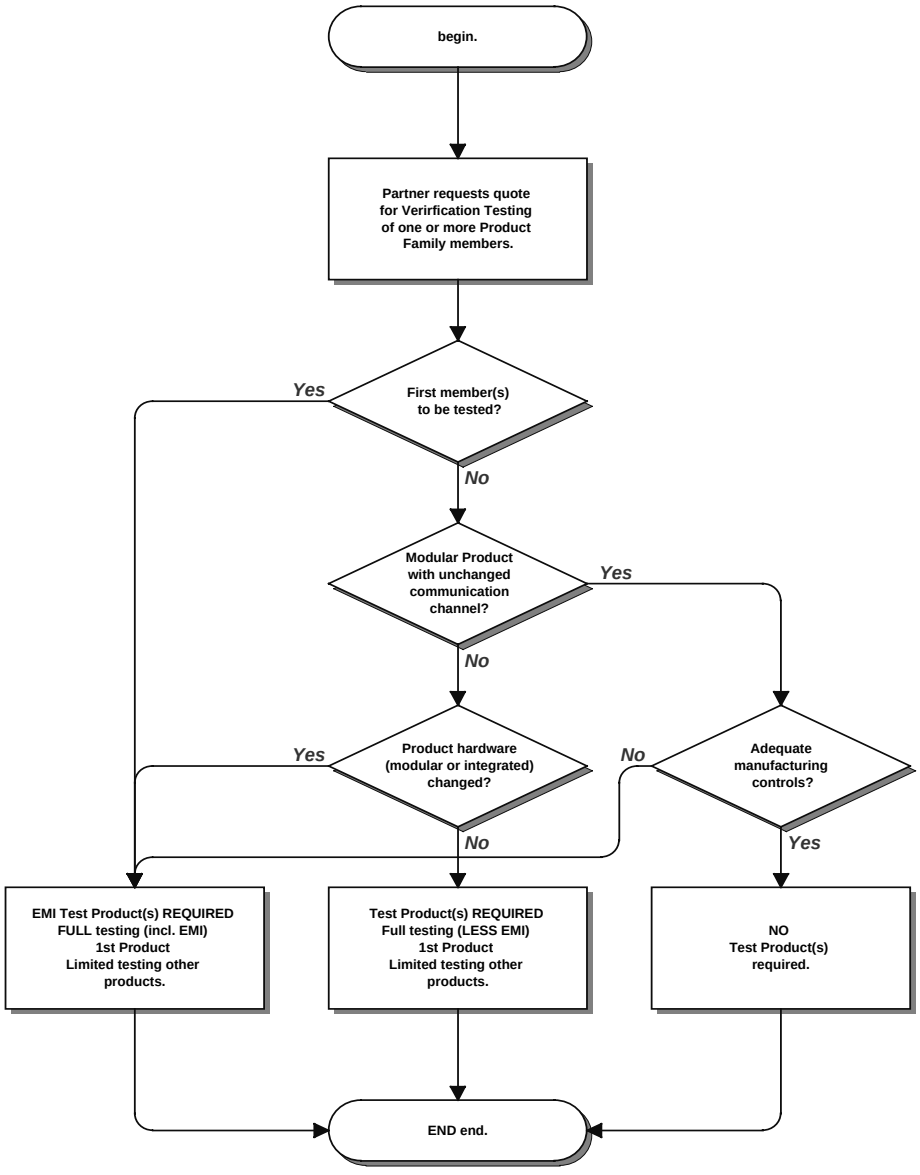


Figure 7. Verification Process Flow - Product Family Members

The following flow diagram shows the test execution section of the ***Product Verification*** Procedure:

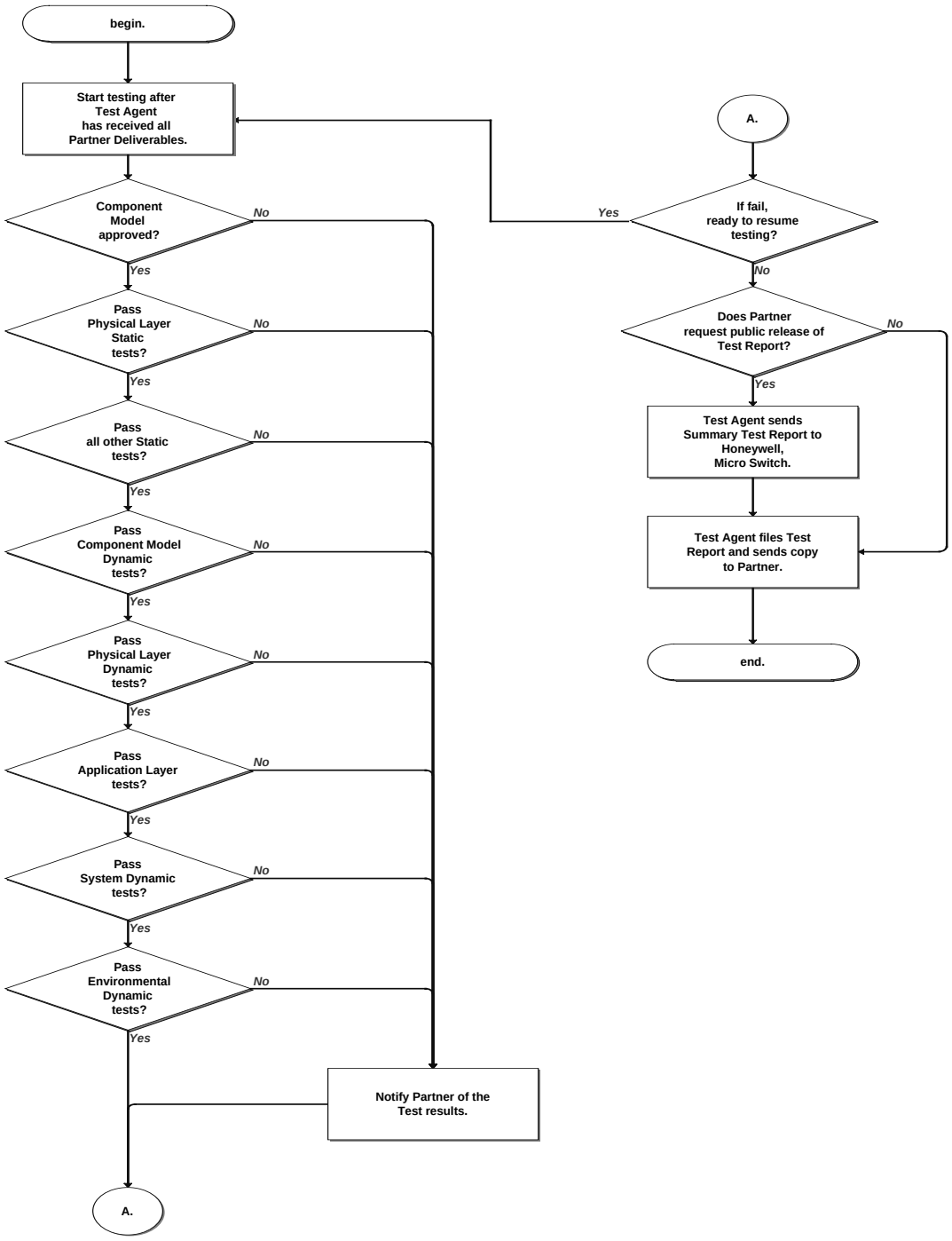


Figure 8. Verification Process Flow - Verification Testing

2.4.1 Test Plan

This document provides the specification for the Verification Test Procedure. The Test Plan provides the actual test sequence and includes ***Product*** specific information. A Test Plan is required for each ***Verification*** Test of a Partner Product. Appendix H provides an example of a Verification Test Plan.

2.4.2 Check Lists

The Check Lists, which are included in this document, provide for thorough and consistent documentation of ***Verification*** Test results. Individual Check List files are also provided, to ***Certified Test Agents***, in Microsoft Word 6.0 format. Documentation of the Check List items is required. Edited files, hand written entries, or any other method that documents all of the Check List items as presented in this document, is acceptable.

2.4.3 Log Files

Log Files, of bus message traffic, are required for all ***Dynamic Tests***. Log File documentation can be either the actual data files or file printouts.

2.5 Verification Requirements - Certified Test Agent

Certified Test Agents are responsible for assuring the validity of all of their ***Verification*** Testing procedures, results, and records throughout the verification period for each ***Product*** tested. The specific responsibilities include the following.

2.5.1 Training - Certification Requirements

Test Agent training requirements include attendance, by the current lead test person, at a ***Smart Distributed System*** Developers School - Test Agent Track. The next step, for initial training, involves one to several days of on-the-job training which may be at the Test Agent's location or at MICRO SWITCH.

Other on-going training may be required due to additional and/or modified test specifications, as the result of periodic audits, or may be initiated by the Test Agent.

2.5.2 Audits

Certified Test Agents are subject to periodic audits of the ***Verification*** Test process, personnel, and records.

2.5.3 Testing Quotations

Certified Test Agents are responsible for providing a pricing guideline that is a range of the ***Verification*** Test pricing intended to cover 80% of the transactions. Test Agents are also responsible for providing specific price and schedule quotations to Partners requesting them.

2.5.4 Verification Testing

The primary responsibility of ***Certified Test Agents*** is to perform the ***Smart Distributed System Verification*** Testing, for Partners, as specified by, and in accordance with, all ***Smart Distributed System*** specifications.

2.5.5 Test Report

Certified Test Agents are responsible for providing a formal written Test Report to the Partner within thirty days following completion of each ***Verification*** Test project. This Test Report will normally contain only the summary test results. Additional details should be provided to the Partner if requested or as otherwise appropriate. The specific requirements for Test Reporting are covered in Section 6 of this document.

2.5.6 Verification Test Records

Certified Test Agents are responsible for maintaining complete records of all ***Verification*** Testing for one year after each ***Product*** Verification expires (i.e. all test records for a specific catalog listing must be maintained until there is a gap of one year or more where the Product Verification is not valid).

Upon successful completion of each Product Verification Test, the Test Agent is responsible for determining if the Partner will sign a formal release agreement (when the Partner chooses to release specific summary Verification Test results). This agreement gives both the Test Agent and Honeywell unrestricted rights to publish the public summary test results. Whenever the Partner releases the test results, the Test Agent is responsible for providing the public summary test results to Honeywell, MICRO SWITCH, who will make this Verification Test information available to the ***Smart Distributed System*** community.

2.5.7 Product Related Complaints

Certified Test Agents are responsible, in the case of certain Verified ***Product*** related complaints, to contact the Partner and determine the course of action. The Test Agent must handle complaints that are related to product behavior that has been tested according to this specification. The Test Agent is not responsible for complaints concerning other product issues.

Complaints may come either directly to the Test Agent or to Honeywell, MICRO SWITCH. Whenever a Test Agent receives a direct complaint, they should first communicate the complaint to MICRO SWITCH, ***Smart Distributed System*** Partners Program Coordinator.

In all cases, MICRO SWITCH will screen the complaints and communicate only the “validated” (i.e. on the basis of additional information, it has been determined that the complaint should be investigated) complaints to the responsible Test Agent.

The Test Agent is then responsible for contacting the Partner and determining the probable responsibility:

1. None - the complaint is not valid.
2. Partner - Product or Test Requirements have changed.
3. Honeywell, MICRO SWITCH - Test requirements are missing or ambiguous.
4. Test Agent - Test process varied from specifications and/or Test Plan.

The Test Agent also determines the next course of action – normally this also involves communicating that requested action (if any) to the responsible party. In case of a disagreement about either the responsibility or the action, the Test Agent's responsibility is then to report the status to the MICRO SWITCH ***Smart Distributed System*** Partners Program Coordinator.

2.6 Verification Status Record

The Verification Status Record is the formal public record of ***Smart Distributed System Verification*** Testing results for a Partner ***Product***. Upon request from the Partner, the VSR is placed in the public domain. VSRs are a vehicle for communicating the public ***Smart Distributed System***, product related, Verification Testing results without any restrictions. The purpose of this vehicle is to promote the general availability of product verification information to users and potential users - to provide the best opportunity of selecting the ***Smart Distributed System*** products best suited to their applications.

An example of a VSR is shown in Appendix I.

3. Partner Deliverables for Product Verification

3.1 Component Model Approval

The first step in the ***Smart Distributed System*** Product Verification process is to determine the Component Model(s) for the Partner's ***Product***. If an established model is used, no approval is needed for this step. If the Partner requests one or more new models, they must be submitted via the Developers Toolkit software which is available to Partners who are developing ***Smart Distributed System*** products. The ***Model Review Group*** will either approve the model as submitted or recommend that the Partner make specific changes - based upon the model's compliance to the Component Modeling Specification, *Reference /7/*.

3.2 Product Model

Once the Component Model(s) is approved and the Partner ***Product*** is ready for Verification Testing, the next step is to complete the Product Model form, which summarizes all required Product Verification items.

Figure 9 lists the declarations and documentation that must be provided by the Partner and accompany the ***Test Product*** when submitted for Product Verification testing.

	Declaration (Product Model Form Appendix E)	**Documentation**
Auxiliary Power	✔	Full documentation required
CAN Controller	✔	CPL
Component Model Number	✔	
Connector Drawing		Full documentation required
Connector Type	✔	CPL (Mini/Micro)
Description of Services		Full documentation required
Functional Test Diagram		Full documentation required
Functional Test Specification		Full documentation required
Initialization Time	✔	
Maximum Supply Current	✔	Full documentation required
Network Data Descriptor	✔	Full documentation required
Product Critical Parts List		Full documentation required
Product Specification		Full documentation required
Software Version	✔	
Status Display Indicators	✔	
Transceiver Schematic		Full documentation required
Transceiver Type	✔	CPL (Integrated Transceiver)

Figure 9. Product Documentation

The Product Model form is shown in Appendix E. The following paragraphs describe the required items.

3.2.1 Transceiver Type

Transceiver Type (Integrated, Optocoupled or Discrete) must be declared and the implementation documentation must be submitted.

3.2.2 Transceiver Schematic

The ***Test Product*** transceiver schematic must be submitted. The schematic must have sufficient detail to show that the overall design is adequate and to identify all critical parts.

If the Test Product uses the Discrete Transceiver, its overall design is critical to ***Interoperability***. Normally the Transceiver schematic will be sufficient for review.

However, if the Transceiver design is unique or unusual, any available test documentation would facilitate the review.

3.2.3 CAN Controller Bit Timing

The Bit Timing for CAN Controllers is specified in *Reference /9/*, Critical Parts List. The primary purpose of this declaration is to identify either a new CAN Controller or a new configuration that may be approved following successful Verification Testing.

3.2.4 CAN Controller Population

Declaration of either single or multiple CAN Controllers is required. If multiple CAN Controllers are used, full implementation documentation is required also.

3.2.5 Bus Connector Type

Declaration of the Bus Connector Type (e.g., Mini/Micro, Terminal Strip) is required because the different Connector Types have different Verification requirements (e.g., Mini/Micro Connectors must be on the Critical Parts List). The Partner must also provide the supplier name and part number for Mini/Micro connectors.

3.2.6 Bus Connector Drawing

A drawing of the bus connector must be provided and the connector type identified on the form found in Appendix E. The drawing must identify the connector pins and relate them to the CAN interface.

3.2.7 Product Critical Parts List

Certain Critical Parts (e.g. transceiver components and bus connectors) must match exactly (Supplier and Part Number) one of the items in the ***Critical Parts List***. A list of these parts, which are used in the ***Product***, along with certain part parameters (see Critical Parts List), must be submitted prior to testing.

3.2.8 Functional Test Diagram

This diagram shows how the device should be connected during test and is representative of normal operation of the Partner ***Product***. This diagram must show all connections that directly or indirectly affect communication with the product on the bus. The diagram must also specify how any auxiliary power is used by the product.

3.2.9 Functional Test Specification

This document defines how the Partner ***Product*** should function during test (representative of the normal operation of the product) and must include all functional parameters that directly or indirectly affect communication of the product on the bus.

3.2.10 Product / Product Family Specification

The Product Specification is the product documentation that is provided, with the Partner Product, to the customer.

If the ***Test Product***(s) are part of a product family, where the ***Smart Distributed System*** communication channel is identical for all family members, the Partner must supply product family documentation and/or additional Test Products as determined by the Test Agent.

3.2.11 Maximum Bus Current

The maximum node current must be declared. This is normally the absolute maximum Bus Power Supply current drawn by the node, which includes the total maximum current drawn by any peripheral components or any modular components. Due to the possible complexities of modular components, an option is to first specify a configuration and then declare the maximum Bus Current for that configuration.

3.2.12 Auxiliary Power

If a Product uses any power source in addition to Bus Power (i.e., Auxiliary Power), this must be declared. Implementation and any necessary application documentation is also required.

3.2.13 Heartbeat

If the Product has any Heartbeat functionality or service requirements, this must be declared and the documentation provided.

3.2.14 Initialization Time

Product initialization time is defined as the maximum time required for a Product to get into the Autobaud mode following application of bus power. The recommended maximum time is 500 milliseconds.

3.2.15 Status Display Indicators

Smart Distributed System Status Display Indicators are optional. If the Product uses this option, it must be declared for the Red and/or Green indicators used by the Product.

3.2.16 Software Version Number

A Software Version Number must be declared for the Product. The Software Version Number must change to a value not previously used any time the Product firmware changes in any way.

3.2.17 Component Model Number

The ***Test Product*** includes one or more approved Component Models, which define the ***Smart Distributed System*** functionality of the Partner Product. All Models used by the Product must be declared.

The Partner's Component Model document contains the component model(s) as it will be published by the Partner. The approved models define maximum data lengths and counts. The Partner's Model(s) may use lengths less than the specified maximums. This document also specifies the factory data values for the Attributes.

3.2.18 Component Model Feature Descriptions

A text description of each Attribute, Action and Event shall document its functionality. The type and size of any data elements, the result of each Action request and the trigger conditions for each Event shall also be documented.

3.2.19 Network Data Descriptor

The Network Data Descriptor data value(s) shall be declared. If there are multiple NDDs, the purpose and conditions of their use must be fully documented.

3.3 Product Sample

A Product test sample, ***Test Product***, that is representative of a production unit, must be submitted for testing. The Test Agent will retain this sample for future reference and for other system tests. The sample will not be returned to the Partner but will be added to the network that is used for system testing of all devices. If the Test Product has a Serial Number attribute, the Partner should initialize it prior to submitting the Product for testing.

If the Test Product is a product family member, additional test samples may be required as determined by the Test Agent. Any additional product samples will be returned to the Partner following completion of Verification Testing.

3.4 Product Test Fixturing

Test fixturing, if necessary to generate Events and/or display the results of Actions, must be provided by the Partner for product Verification Testing. The Test Agent is not responsible for developing test fixtures. Any test fixtures should have a Partner supplied Fixture Identification Number affixed to each fixture. Any Partner supplied test fixturing will be returned to the Partner upon completion of Verification Testing.

4. Static Verification Testing

Many important parameters of a Partner Product are verified prior to the communication channel, ***Dynamic Tests*** (section 5.), via the ***Static Tests*** defined in this section. Static Tests may involve both the Product documentation and the ***Test Product***.

4.1 Product Model

The Product Model Form (Appendix E), which must be completed by the Partner prior to Verification Testing, includes the identification of all documentation items needed for the following ***Static Tests***.

4.2 Component Model

All Component Models used by the Product must be approved. All new Component Models (not previously approved) for the Partner ***Product*** must be submitted to the ***Model Review Group*** for **approval** prior to any Verification Testing. Partners using existing models must submit their documentation of the model to the Model Review Group for review prior to any Verification Testing. This includes all hierarchical levels for the Component Model. The Developers Toolkit software is available for documenting this information. Because the DTK automatically forms the primitive tags and assures the accuracy of the tags, the model information must be submitted via DKT export files. The required model information is displayed in the Forms section of this document (Appendices A through D).

Component Model Approval

The Component Model is the list of Attributes, Actions, and Events supported by the device. This Component Model must follow the Component Model Specification *Reference /7/*. Whenever possible, the component model for a new device should inherit from existing component models.

Each hierarchical level of each Component Model for the ***Product*** must be submitted. (e.g. a developer of a Component Model that is defined at level 10.1.2.4 must also include the Component Model for level 10.1.2, level 10.1, and if not already defined, level 10.0.). The required method for submittal is to use the DTK export files, which provide the information described in the Forms section of this document.

The Component Model Approval will include the following:

Adherence of the Component Model to the Model Guidelines If a problem is found, based either upon 1.) the Component Modeling Specification, *Reference /7/* or 2.) the Model's fit in the overall I/O model hierarchy, it will be reviewed with the Partner. The Partner is responsible for making any necessary changes and resubmitting the Component Model for final review.

Ability to inherit from existing Component Models If the submitted Component Model is unique, it will be examined against existing Component Models to determine if inheritance is possible. If inheriting from an existing Component Model is possible, the Component Model will be reviewed with the Partner and revised by the Partner if necessary.

4.2.1 Component Model Static Test

Specification: *Reference /7/*, Component Modeling Specification

Necessary Equipment, etc: Product Component Model(s)

A. General

Verify that all Product Component Model(s) have been approved.

B. Test Set-up

None

C. Test Steps

Check if status of all ***Test Product*** Component Model(s) is ***Approved*** or ***Verified***.

D. Test Pass Criteria / Analysis

Test Pass Criteria: Product Component Model(s) status is ***Approved*** or ***Verified***.

Analysis: None

4.3 Physical Layer Static Test

4.3.1 Physical Bus Connection

Specification: *Reference /4/*, Physical Layer Specification, Section 3.3.1.3.2

Necessary Equipment, etc: Connector Drawing

A. General

If ***Test Product*** uses a Mini/Micro Connector for bus connection, verify that the connector supplier and part number are listed on the current ***Critical Parts List***.

If Product uses a Pluggable Terminal Block, verify that the part design details are according to the ***Smart Distributed System*** Specifications (*Reference /4/* Section 3.3.1.3.3).

If Product uses Individual Terminals or Non-Standard Terminal Order, verify that the terminals are labeled according to the ***Smart Distributed System*** Specifications (*Reference /4/* Section 3.3.1.3.3).

B. Test Set-up

None

C. Test Steps

1. Verify that one of the Connector types, listed on the Appendix E form, is checked.
2. Verify that the Product has only one bus connector/connection.
3. If Mini/Micro, identify Test Product connector supplier and part number from product and/or Product Model.
4. Check if the Mini/Micro connector is on the Critical Parts List.
5. If Terminal Block, verify connection type and terminal order and any required labeling is according to specification (*Reference /4/* Section 3.3.1.3.3).
6. If Individual Terminals, verify terminal labeling is according to specification (*Reference /4/* Section 3.3.1.3.3.3).
7. Verify Bus Connector wiring is according to specification (*Reference /4/* Section 3.3.1.3.2).
8. Verify, visually, if connector on the Product matches connector drawing.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. Standard bus connector/connection.
2. Only one bus connector.
3. Mini/Micro bus connectors must match exactly (Supplier and Part Number) one of the entries in the Critical Parts List.
4. Pluggable terminal blocks must conform to the specified requirements (*Reference /4/* Section 3.3.1.3.3).
5. Terminal Block must use specified terminal type (i.e., screw or spring clamp) (*Reference /4/* Section 3.3.1.3.3).
6. Terminal Blocks must use standard terminal order or label terminals as specified (*Reference /4/* Section 3.3.1.3.3).
7. Individual Terminals must have terminal labels as specified (*Reference /4/* Section 3.3.1.3.3).
8. Product connector visually matches connector drawing.

Analysis: None

4.3.2 Transceiver Design

Specification: *Reference /4/*, Physical Layer Specification, Section 4

Necessary Equipment, etc: Transceiver Schematic

A. General

Verify that one of the three Transceiver types, listed on the Appendix E form, is checked.

B. Test Set-up

None

C. Test Steps

Determine if Test Product Transceiver is one of the three specified types.

D. Test Pass Criteria / Analysis

Test Pass Criteria: Transceivers must be one of the three types specified in *Reference /4/* Section 3.2.4.

Analysis: None

4.3.3 Transceiver Schematic

Specification: *Reference /4/*, Physical Layer Specification, Section 4

Necessary Equipment, etc: Transceiver Schematic

A. General

Verify that the Partner Transceiver schematic and the actual ***Product*** transceiver design is of the type declared (Appendix E form) and that the critical components are on the Critical Parts List.

B. Test Set-up

None

C. Test Steps

1. Verify that the Product Transceiver is of the type declared by the Partner.
2. Identify all critical Transceiver parts by examining the ***Test Product*** and/or the Product Specification.
3. Determine if all critical Transceiver parts (e.g., integrated transceiver, optocoupler) are on the ***Critical Parts List*** (*Reference /9/*).

D. Test Pass Criteria / Analysis

Test Pass Criteria: The transceiver type is as declared by the Partner, and each critical part must match exactly (Supplier and Part Number) one of the entries in the Critical Parts List.

Analysis: In the case of differences, the test result options are: 1) test failure or 2) test pass with caution/recommendation. The purpose of analysis is to assess the risk of conditionally passing a part that looks right but is not on the list.

4.3.4 CAN Crystal

Specification: *Reference /9/*, Critical Parts List

Necessary Equipment, etc: CAN Crystal manufacturer name and part number

A. General

Verify that the CAN Controller Crystal is on the Critical Parts List.

B. Test Set-up

None

C. Test Steps

1. Identify Test Product CAN Crystal from Product and/or Product Model.
2. Determine if CAN Crystal is on the Critical Parts List.

D. Test Pass Criteria / Analysis

Test Pass Criteria: CAN Crystal is found on the Critical Parts List.

Analysis: None

4.4 Data Link Layer Static Test

Specification: *Reference /9/*, Critical Parts List

Necessary Equipment, etc: Transceiver Schematic

A. General

Verify that the CAN Controller component is on the ***Critical Parts List***.

B. Test Set-up

None

C. Test Steps

1. Identify Test Product CAN Controller component from the Product documentation.
2. Determine if CAN Controller component is on the Critical Parts List.

D. Test Pass Criteria / Analysis

Test Pass Criteria: CAN Controller component is found on the Critical Parts List.

Analysis: None

4.5 Application Layer Static Test

Specification: *Reference /7/,* Component Modeling Specification

Necessary Equipment, etc: Product Component Model

A. General

If the Test Product Component Model defines any new application services, check their similarity to established services.

B. Test Set-up

None

C. Test Steps

Determine if ***Test Product*** includes any "new" services (i.e. ***Smart Distributed System*** Services which provide some functionality previously not included in any model).

D. Test Pass Criteria / Analysis

Test Pass Criteria: If any new services, they are similar to existing services. If any question(s) can not be answered before the dynamic testing is completed, mark the test result Conditional Pass -- and record the questions.

Analysis: If there is any question about any service, mark the service for special scrutiny during Dynamic Verification Testing.

Partner Name: **Date:**
Partner ID: **Verification No:**
Product Name: **Certified Test Agent:**
Catalog Listing:

Check List 1. Physical Layer - Static

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
4.2.1	Component Model Static Test	Component Model(s) approved?	(Y/N) ___
4.3	Physical Layer Static Test		
4.3.1	Physical Bus Connection -ALL Connectors-	1) allowable type? 2) 1 con./product? 3) male pins? 4) Pin-outs per spec? 5) visual match?	(Y/N) ___ (Y/N) ___ (Y/N) ___ (Y/N) ___ (Y/N) ___
	Physical Connection -Mini/Micro-	1) on Critical Parts List?	(Y/N) ___
	Physical Connect. -Terminal Block- fixed/pluggable	1) keyed? 2) screw/spring? 3) standard order? 4) Term's labeled?	(Y/N) ___ (Y/N) ___ (Y/N) ___ (Y/N) ___
	Physical Connect. -Indiv. Term's-	1) Term's labeled?	(Y/N) ___
4.3.2	Transceiver Design	Allowable type?	(Y/N) ___
4.3.3	Transceiver Schematic	Transceiver type as declared? Critical parts on CPL: 1) Transceiver? 2) Optocoupler?	(Y/N) ___ (Y/N) ___ (Y/N) ___
4.3.4	CAN Crystal	Crystal on CPL?	(Y/N) ___
4.4	Data Link Layer Static Test	CAN Controller on CPL?	(Y/N) ___
4.5	Application Layer Static Test	If any "new" services: a) like existing?	(Y/N) ___ If 'N', Conditional PASS - special scrutiny req'd in Dynamic Test.

5. Dynamic Verification Testing

The ***Smart Distributed System*** communication channel, of Partner ***Products***, is verified through ***Dynamic Testing***, as defined in this section.

Standard product addressing conventions are used throughout this section. ***User Addresses*** are normally used in the test descriptions (i.e. the primary address references are User Addresses). However, all references to addresses, as they appear on the bus or in actual message fields, are ***Logical Addresses***.

5.1 Product Model

The Partner's Product Model, including all of the approved Component Model(s) used by the ***Test Product***, is the basis for the ***Dynamic Tests*** of this section. The purpose, of these tests, is to verify the Test Product's dynamic conformance to: 1.) the Partner's Product Model, 2.) the approved Component Model(s), and 3.) all applicable ***Smart Distributed System*** specifications.

5.2 Component Model Dynamic Test

Verify all Attributes, Actions, and Events defined for the Product by each of its approved Component Model(s) and detailed by the Partner's Product specific documentation. These tests shall be conducted with the bus Power Supply set to 11.0 Volts unless otherwise specified.

The Device Conformance test set-up is shown in Figure 10.

The Honeywell Device Conformance Tester (SDS-PCS-TK26) is available to facilitate device ***Conformance*** level testing.

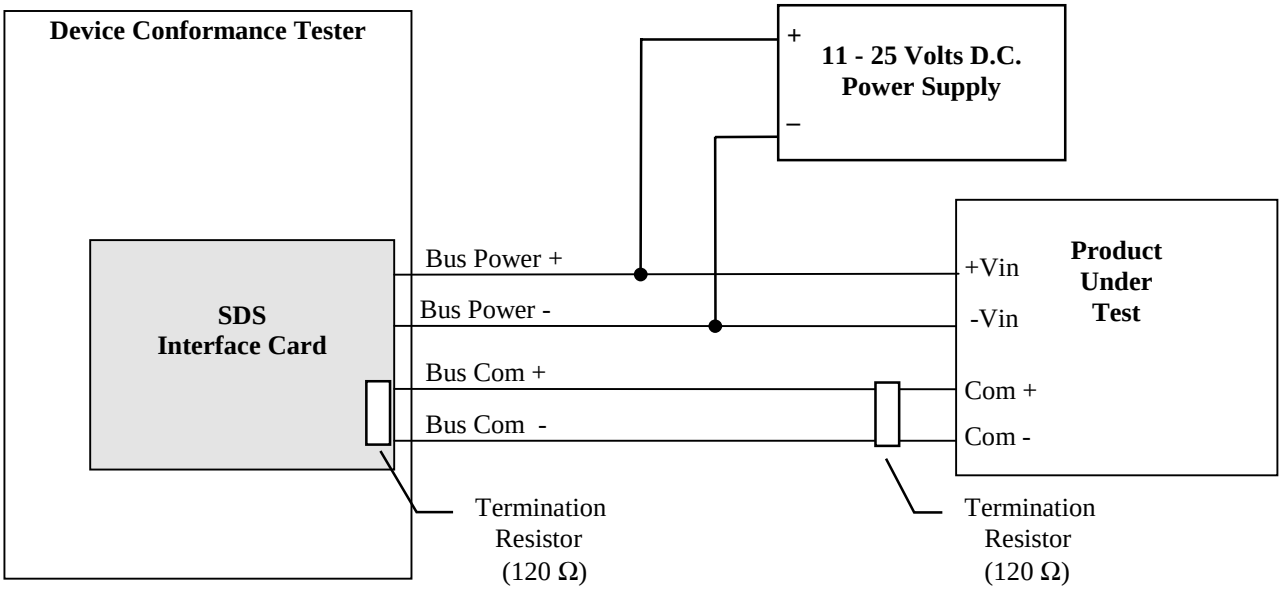


Figure 10. Device Conformance Test Set-up

5.2.1 Attributes

Specification: Partner's Approved Component Model

Necessary Equipment, etc: Test System capable of communicating all of the messages which are needed to verify the ***Test Product's*** conformance to the approved Component Model.

A. General

Verify the Test Product's conformance to the approved Component Model Attributes by issuing the appropriate Read/Write request messages and verifying the Product's response messages.

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. For each Attribute identified in the Model, issue a Read Request message, with the appropriate Attribute ID, to the Product.
2. For each Attribute identified as writable, issue a Write Request message, with the appropriate Attribute ID, to the Product.
3. For each Attribute identified as read-only, issue a Write Request message, with the appropriate Attribute ID, to the Product.
4. For each Attribute identified in the Model, issue a Read Primitive Tag Action Request, with the appropriate Attribute ID, to the Product.
5. Issue a single Password Action Request message, with a null password (e.g., 0x0000), to the Product and verify that the Product returns a successful response. Cycle bus power and any auxiliary power to the PUT.
6. If the device has any other alternate modes which should/should not effect the Product's response, test in each mode to verify the specified responses.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. Test Product produces the proper Successful Response message for each Read Request.
2. Test Product produces the proper Successful Response message for each Write Request.
3. Test Product produces the proper Error Response message for each Write Request.
4. Test Product Primitive Tags match or conform to the absolute maximum limitations of the Model specifications. For example, if the model defines the maximum string length for character data, the product specification may define a maximum length which is shorter than or the same as the model specification.
5. Test Product produces a successful response message following a password action request.

Analysis: None

5.2.2 Actions

Specification: Partner's Approved Product Model

Necessary Equipment, etc: Test System capable of communicating all of the messages which are needed to verify the ***Test Product's*** conformance to the approved Component Model.

A. General

Verify the Test Product's conformance to the approved Component Model Actions by issuing the appropriate Action request messages and verifying the Products response messages.

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. For each Action identified in the Model, issue a Action Request message, with the appropriate Action ID, to the Product.
2. If the device has alternate modes which should/should not effect the Product's response, test in each mode to verify the specified responses.
3. If alternate request message formats are specified for an Action, test each format.

Note: Document all tests (set-up and results).

D. Test Pass Criteria / Analysis

Test Pass Criteria: Test Product produces the proper response message for each request.

Analysis: Analyze Product Specification to identify any multiple test modes (re. Test Step 2.).

5.2.3 Events

Specification: Partner's Approved Component Model

Necessary Equipment, etc: Test System capable of communicating all of the messages which are needed to verify the ***Test Product's*** conformance to the approved Component Model.

A. General

Verify the Test Product's conformance to the approved Component Model Events by stimulating the Product, as specified, to produce the corresponding Event Request message.

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. For each Event identified in the Component Model, stimulate the Product, as specified in the Product Specification.
2. If the device has alternate modes which should/should not effect the Product's response, test in each specified mode.

D. Test Pass Criteria / Analysis

Test Pass Criteria: Test Product produces the proper Event Request message for each specified condition.

Analysis: Analyze Product Specification to identify any multiple test modes (re. Test Step 2.).

5.2.4 Short Form Services

This section applies ONLY to Single Binary I/O (Models 1.1 and 1.3) and Multiple Binary I/O (1.10) where a single input and a single output is specified.

Check each Short Form Services which apply to the I/O type.

For COS ON and COS OFF, stimulate the Product as specified to produce the Short Form service request message, and verify the proper message is received. If these services are not defined for the Product, verify that there are no request messages sent regardless of Product stimulation. The test procedure for COS ON/OFF is in paragraph 5.5.1, ALP Services.

For Write ON and Write OFF, issue the Write ON/OFF Short Form request messages and verify both the proper response message and the specified output state changes. If these services are not defined for the Product, verify that the Product responds with the appropriate Error message. The test procedure for Write ON/OFF is in paragraph 5.5.1, ALP Services.

5.2.5 Network Data Descriptor

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: Partner's Approved Component Model

A. General

If defined in the Component Model, read the Attribute containing the NDD data value and verify its value(s) and structure.

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. Issue a Read Request message, with Attribute ID = 0 (NDD), to the Test Product.
2. Observe if Product sends a Read Response message.
3. If so, compare response data with the value specified in the Product Model.
4. Read the Primitive Tags of the Attribute(s) identified in the NDD.
5. Compare the Primitive Tag value(s) with the value(s) specified in the Component Model.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. Attribute 0 data matches NDD specification in Component Model.
2. The Primitive Tag(s) of the I/O Attribute(s), identified in the NDD, match the NDD specification in the Component Model.

Analysis: If any incorrect or unexpected responses from the Test Product, capture any relevant information and/or analysis.

5.2.6 Model Number

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: Partner's Approved Component Model

A. General

If defined in the Component Model, read the Attribute containing the Model Number. Verify that the Model Number data matches the Component Model number specified in the Product Model form.

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. Issue a Read Request message, with the Attribute ID for Model Number.
2. Observe if any Read Response message from Product.
3. If so, observe data (Component Model Number).

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. Product issues a Read Response message.
2. Read Response data (Component Model Number) matches the declaration in the Product Model and the value in the Partner's Model documentation.

Analysis: None

5.2.7 Predefined Attribute Data Values

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: Partner's Component Model

A. General

For each Attribute having a predefined data value (in Product documentation), read the Attribute and verify that the Product data matches the value specified.

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. For each Attribute having a predefined data value, issue a Read Request message, with the corresponding Attribute ID, to the Test Product.

   NOTE: Some predefined values are not static (e.g. Number of Power Cycles) and therefore may not match exactly.

2. For each Request, compare the Product response data with the predefined data value.

D. Test Pass Criteria / Analysis

Test Pass Criteria: For each Attribute having predefined Data Value(s), the Attribute data matches the predefined Data Value(s).

Analysis: None

Partner Name: **Date:**
Partner ID: **Verification No:**
Product Name: **Certified Test Agent:**
Catalog Listing:

Check List 2. Component Model Dynamic Test

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
5.2	Component Model Dynamic Test		
5.2.1	Attributes - all -	R. Resp all Attrs? Primitive Tags ok?	(Y/N) __ (Y/N) __
	Attributes - all read-write -	W. Response all Attributes?	(Y/N) __
	Attributes - all read-only -	Error Response all Attributes?	(Y/N) __
	Password Protect. - one PW Act Req -	Successful Response to password action?	(Y/N) __
5.2.2	Actions	Resp for all Act's?	(Y/N) __
5.2.3	Events	Req for ea. Event?	(Y/N) __
5.2.4	Short Form Services	(see 5.5.1)	
5.2.5	Network Data Descriptor	Attr 0 = Model NDD? I/O P.Tags = NDD?	(Y/N) __ (Y/N) __
5.2.6	Object Number	Resp = C. Model #?	(Y/N) __
5.2.7	Predefined Attribute Data Values	Attr. data = predefined data?	(Y/N) __

5.3 Physical Layer Dynamic Test

5.3.1 Transceiver - All

5.3.1.1 Transceiver Reverse Bus Power Test

Specification: *Reference/4/,* Physical Layer Specification, Section 3.2.4.1

Necessary Equipment, etc: None

A. General

After applying reverse bus power, verify Transceiver functionality by connecting the ***Test Product*** to a ***Control Interface*** Master (host), with correct bus power applied, and then running the Autobaud Test (section 5.5.3.1).

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. Apply reverse bus power for at least 10 seconds.

   Note: Reconnect bus power with correct polarity.

2. Remaining steps are the same as paragraph 5.5.3.1 Autobaud.

D. Test Pass Criteria / Analysis

Test Pass Criteria: Same as paragraph 5.5.3.1.

Analysis: Same as paragraph 5.5.3.1.

5.3.2 Transceiver - Discrete

This section applies ONLY to Products using a discrete transceiver.

5.3.2.1 Transceiver Differential Input Resistance

Specification: *Reference /4/,* Physical Layer Specification, Section 3.2.4

Necessary Equipment, etc: Resistance Meter (100 Kohm range, 1% FS accuracy)

A. General

Verify if Transceiver Differential Input Resistance is greater than or equal to the minimum specified value.

B. Test Set-up

Figure 11, Differential Input Resistance Test Circuit.

C. Test Steps

1. Measure and record the Transceiver Input Resistance $R_{DIFF\ OFF}$.
2. Verify $R_{DIFF\ OFF}$ is greater than or equal to the minimum specified value (*Reference /4/*) when the transceiver is in the non-dominant state (i.e. not transmitting).

D. Test Pass Criteria / Analysis

Test Pass Criteria: Measured value of $R_{DIFF\ OFF}$ is greater than or equal to the minimum specified value.

Analysis: None

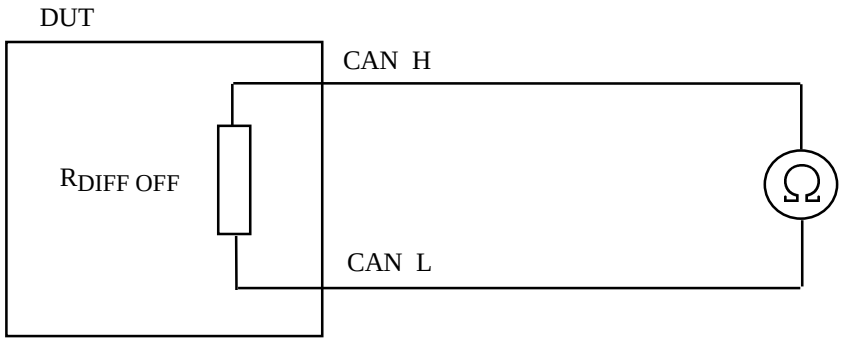


Figure 11. Differential Input Resistance Test Circuit

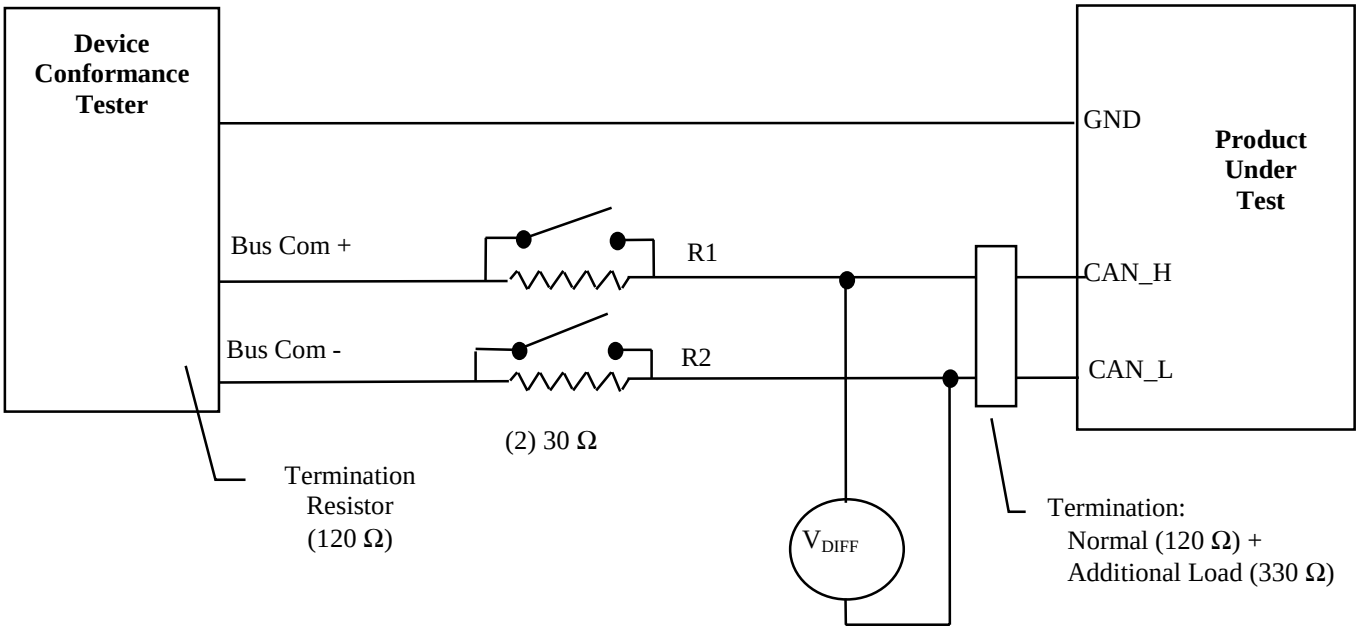


Figure 12. Differential Input Level Test Circuit

5.3.2.2 Transceiver Input Levels

Specification: *Reference /4/*, Physical Layer Specification, Section 3.2.4

Necessary Equipment, etc:

1. Two (2) fixed resistors (30 Ω - 0.1 W).
2. One (1) fixed resistor (330 Ω - 0.1 W).
3. Two (2) switches (or clip leads)
4. Oscilloscope.

A. General

The Transceiver Input Thresholds are measured and compared to the specifications.

B. Test Set-up

1. See Figure 10, Device Conformance Test Set-up and Figure 12, Differential Input Level Test Circuit.
2. After applying bus power, set resistor switches (R1 - IN and R2 - OUT).

C. Test Steps

1. First set VCC to 18.0 Volts.
2. Autobaud Test Product.
3. Verify valid response to any Read or Short Service Request message.
4. Measure and Record the differential input voltage level of the request message at the PUT.
5. Set resistor switches (R1 - OUT and R2 - IN).
6. Verify valid response to any Read or Short Service Request message.
7. Measure and Record the differential input voltage level of the request message at the PUT.

Note: Repeat this test until repeatable test results are observed for both thresholds. If the results vary slightly, record the average result.

D. Test Pass Criteria / Analysis

Test Pass Criteria: If the ON and OFF measurements are not closer to either limit than 15% of the specified limit range, the Product passes this test.

Analysis: If measurements are closer than 15% of the tolerance band from either limit, repeat the test with 1) VCC set to the minimum specification limit and with 2) VCC set to the maximum specification limit. In this case the product passes the test if all three measurements are within the specification limits.

5.3.2.3 Transceiver Output Levels

Specification: *Reference /4/*, Physical Layer Specification, Section 4

Necessary Equipment, etc:

1. Instrument capable of measuring the voltage levels of a digital waveform (e.g. Oscilloscope).
2. One (1) fixed resistor (330 Ω - 0.1 W).
3. One (1) switch (or clip lead).

A. General

Verify if Transceiver Output Voltage levels are within the specified ranges both under no load and maximum load conditions.

Allowing a typical maximum differential input current of 0.1 mA per node, or a total maximum load current of 6.4 mA is equivalent to 625 ohms (i.e. R = 4 V / 6.4 mA). The ISO 11898 maximum load is 341 ohms. The test circuit, Figure 13, uses 330 ohms.

NOTE: Remember to include the (2) required Termination Resistors (see Figure 13).

B. Test Set-up

See Figure 13, Differential Output Level Test Circuit. Set-up is without the maximum load resistor.

C. Test Steps

1. First set VCC to 18 Volts.
2. Cause the Test Product to cycle its output between the ON and the OFF states.
3. Trigger and adjust the scope to monitor the Test Product output signal.
4. Read and record the ON and OFF differential output voltage levels.
5. Connect the maximum load resistor into the test circuit.
6. Read and record the ON and OFF differential output voltage levels.

D. Test Pass Criteria / Analysis

Test Pass Criteria: Voltage levels are within the specified range

Analysis: None.

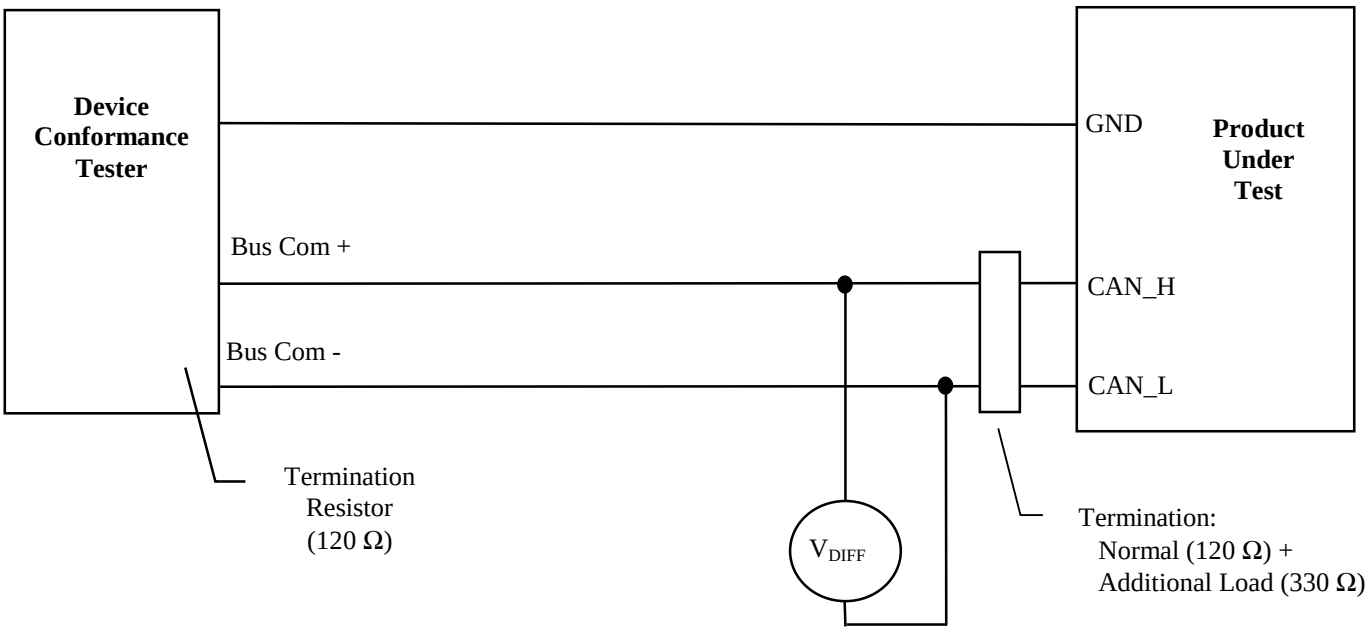


Figure 13. Differential Output Level Test Circuit

Partner Name: **Date:**
Partner ID: **Verification No:**
Product Name: **Certified Test Agent:**
Catalog Listing:

Check List 3. Transceivers

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
5.3.1	Transceiver - All		
5.3.1.1	**Transceiver Reverse Bus Power**	**Autobaud OK?**	**(Y/N) ___**
5.3.2	Transceiver – Discrete		
5.3.2.1	**Differential Input Resistance**	**Measurement:** **Resist. ≥45 K ohm?**	**_____ K ohms** **(Y/N) ___**
5.3.2.2	**Differential Input Levels**	**Diff. ON (with R1)** **Measurement:** **ON (0.9 to 5.0V)?** **Diff. ON (with R2)** **Measurement:** **ON (0.9 to 5.0V)?**	 **_____ Volts** **(Y/N) ___** **_____ Volts** **(Y/N) ___**
5.3.2.3	**Differential Output Levels** **Note 1**	**No Load** **Measurement @ 18V:** **[1]Measurement @11V:** **[1]Measurement @25V:** **ON (1.5 to 4.0V)?** **OFF (-500 to 50mV)** **Max Load** **Measurement @ 18V:** **[1]Measurement @11V:** **[1]Measurement @25V:** **ON (1.5 to 4.0V)?** **OFF(-500 to 50mV)?**	 **_____ Volts** **_____ Volts** **_____ Volts** **(Y/N) ___** **(Y/N) ___** **_____ Volts** **_____ Volts** **_____ Volts** **(Y/N) ___** **(Y/N) ___**

Note 1: If the 18 Volt Measurements are closer than 15% of the tolerance range from either limit, the 11 Volt and 25 Volt [1]Measurements must be taken.

5.3.3 Bus Power

5.3.3.1 Bus Power - Voltage Range Test

Specification: *Reference /4/* Section 3.2.6

Necessary Equipment, etc: Power Supply with variable output (11 to 25 V)

A. General

Verify ***Product*** operation at maximum and minimum Power Supply Voltage level by running Autobaud test.

B. Test Set-up

Set Bus Power Supply Voltage to 25.0 Volts.

C. Test Steps

1. Connect Test Product to test system.
2. Turn Bus Power Supply On -- check voltage level (25.0 V).
3. Initiate Autobaud test.
4. Adjust Bus Power Supply to 11.0 Volts.
5. Turn Bus Power off.
6. Turn Bus Power on.
7. Initiate Autobaud test.

D. Test Pass Criteria / Analysis

Test Pass Criteria: Each Autobaud test succeeds and reports the Test Product address(s).

Analysis: Verify Test Product functionality, at both the maximum and minimum bus power supply levels, by enrolling the Product's Logical Devices (i.e. Autobaud test).

5.3.3.2 Bus Power - Maximum Current Test

Specification: Partner Product Specification

Necessary Equipment, etc:

1. Power Supply with variable output (11 to 25 V)
2. Current Meter

A. General

Verify Partner ***Product*** Maximum Bus Power Node Current specification by monitoring the current while sweeping the Supply Voltage over the full SDS specification. *Reference /7/.*

B. Test Set-up

1. For modular products or products with attached components, if the maximum current specification is for a specific configuration, configure the product as specified by the Partner. If the maximum current specification is independent of the configuration, configure the product with the components that will draw the most bus current.

   Note: Configuration must support the full product functionality (e.g., the configuration for an interface for dumb sensors must include the maximum number of dumb sensors).

2. Connect the Current Meter in series between the Power Supply (+) and the Test Product V+, with meter input (+) connected to the Power Supply.

C. Test Steps

1. Slowly sweep the Bus Power Supply between the minimum and maximum limits (11 - 25 V) while observing the Current Meter.
2. Note and record the configuration and the maximum Power Supply current.

D. Test Pass Criteria / Analysis

Test Pass Criteria: Maximum Power Supply current is less than or equal to the Partner's specification.

Analysis: None

5.3.3.3 Bus Power - Current Loss Test

Specification: None

Necessary Equipment, etc: Current meter

A. General

The Current Loss Test checks for bus power supply current loss within the ***Test Product***. Figure 14 Current Loss Test Set-up, shows the test set-up. If the case is not conductive, make the connection at the connector shell (if standard connector). If the Test Product has no conductive external parts, skip the case connection.

B. Test Set-up

1. Figure 14 Current Loss Test Set-up.
2. Set VCC to 24.0 Volts.

C. Test Steps

1. Measure I_1 and I_2 .
2. Calculate I_1 - I_2 .

D. Test Pass Criteria / Analysis

Test Pass Criteria: (I_1 - I_2) < 0.1 mA

Analysis: None

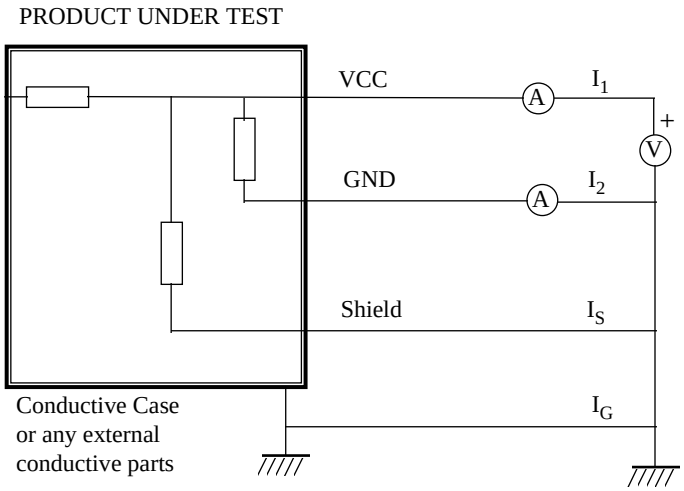


Figure 14. Current Loss Test Set-up

5.3.3.4 Bus Power – Initialization Time Test

Specification: None

Necessary Equipment, etc:

A. General

The Initialization Time Test verifies that the Product is ready for Autobaud within the Maximum Initialization Time declared in the Product Model.

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. Apply auxiliary power (if Product uses auxiliary power).
2. Set DCT "Init Time" to Partner's declared Initialization Time (re., Product Model) except do not use less than 400 milliseconds.
3. Initiate Autobaud from the DCT with DCT "Init Time Test" set to ON.
4. Apply bus power after adjusting the level to 16.0 Volts. (Note: Current DCT provides a window of about 5 seconds following initiation of Autobaud to apply bus power.)

NOTE: If Autobaud is unsuccessful increase the Init Time by 10% with a maximum increase of 100 milliseconds. Repeat all test steps.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

Product responds to Autobaud sequence with the proper response message.

Analysis: None

Partner Name: **Date:**
Partner ID: **Verification No:**
Product Name: **Certified Test Agent:**
Catalog Listing:

Check List 4. Bus Power - Dynamic Test

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
5.3.3	Bus Power		
5.3.3.1	Voltage Range Test	Autobaud @ max,OK? Autobaud @ min,OK?	(Y/N) ___ (Y/N) ___
5.3.3.2	Maximum Current Test	Meas'ment: I_{supply} $I_{supply} \leq$ Partner Specification?	_____ mA (Y/N) ___
5.3.3.3	Current Loss Test	Measurement: I_1 I_2 $I_1 - I_2 \leq 0.1$ mA?	_____ mA _____ mA (Y/N) ___
5.3.3.4	Initialization Time Test	Autobaud OK?	(Y/N) ___

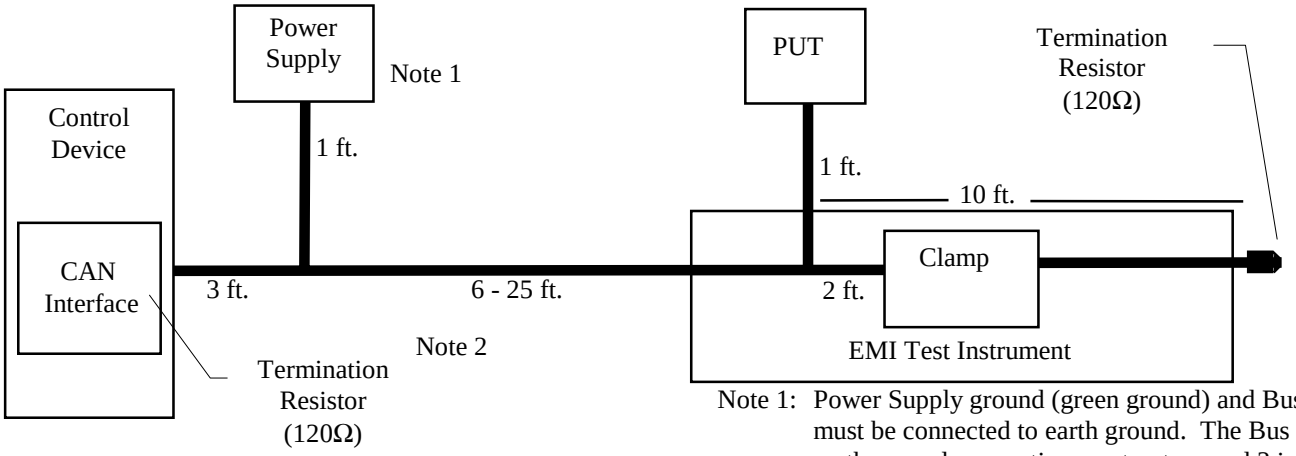
5.3.4 Basic Environmental Dynamic Tests

The Basic ***Integrity*** Tests include the EMI Fast Transient/Burst Test. Figure 5 shows the requirements for this test.

5.3.4.1 ElectroMagnetic Interference (EMI)

Verify the EMI requirement by injecting the signal into the cable (less than 1 meter from the product connector) via a capacitive clamp EMI test instrument.

Any procedural requirements, for the EMI Test Instrument, are beyond the scope of this document.



Note 1: Power Supply ground (green ground) and Bus Shield must be connected to earth ground. The Bus Shield to earth ground connection must not exceed 3 inches in length (keep as short as possible).

Figure 15. EMI Test Set-up

Note 2: The cable lengths separating the PUT and the EMI Test Instrument (Clamp) are critical - the overall cable length must be 3 feet exactly. The other cable lengths are maximum values or ranges.

Specification: *Reference/8/* IEC 61000-4-4

Necessary Equipment, etc: 1. EMI Test Instrument - capacitive clamp type.

A. General

The Fast Transient/Burst Test shall be performed in accordance with the requirements and procedures of IEC 61000-4-4.

Note: It is preferable to complete this test between other ***Dynamic Tests*** to provide high assurance both that the ***Test Product*** is fully functional before the EMI Test and that it has not sustained any permanent damage resulting from this test.

B. Test Set-up

1. All of the Fast Transient/Burst test set-up requirements of IEC 61000-4-4, Part 4, Section 4 are applicable to this test. (re., Figure 6 – Block-diagram for electrical Fast Transient/Burst Immunity test, and Figure 7 – General test set-up for laboratory type tests).
2. See Figure 15 EMI Test Set-up. All bus cabling must be plug-and-play. If Test Product does not have plug-and-play connector, adapter cable must be no longer than 2 feet.
3. Baud Rate is typically 125 Kbit/s (or the slowest Baud Rate supported by the ***PUT***).
4. Input devices must be set to the unsolicited mode.
5. The Test Product shall be subjected to a Fast Transient/Burst level of 0.5 kV with a 5 ns risetime and a 50 ns pulse width with a 5 kHz repetition frequency.

C. Test Steps

1. Submit the Test Product to the specified Fast Transient/Burst level (see Test Set-up) for at least 60 seconds, and simultaneously monitor the PUT for any extraneous I/O signals.
2. Observe one or more typical I/O points, if applicable, during the burst period. For input devices, run the test twice – once with the input activated and once with it not activated.
3. For input devices verify that there are no unsolicited COS or COV APDUs issued by the device during the test. For output devices verify that there are no false pulses with pulse width > 1 μ sec.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

The Test Product shall continue to operate as intended during and after the test. No changes of actual operating state or stored data is allowed within the Test Product. Temporary loss of function is allowed, provided the Product fully recovers automatically or via its controls. Specific criteria include:

1. Does not drop or add messages.
2. No control system lock-up.
3. No unsolicited COS or COV APDU from any observed input device.
4. If any observed Output point changes state unexpectedly, false pulse width must be < 1 μ sec.
5. No change in analog value > 10 times the nominal tolerance.
6. No change in digital value.
7. No device reset indication.
8. No device self test failure indication.
9. No Error Response APDUs.

Allowable degradation in performance includes:

- audible signals(not associated with control I/O)
- visible indicators (not associated with control I/O)
- temporary operate point deviations
- excessive data bus traffic (transmission retries, error frames, etc.)

Analysis: As necessary to determine proper functionality following successful completion of this test.

5.3.5 Bus Status Display Indicator Test

This section applies ONLY to Products declaring *Standard Bus Status Display Indicators* in their Verification Test Product Model (see Appendix E).

Specification: *Reference /4/*, Physical Layer Specification, section 3.1.7.

Necessary Equipment, etc: Control Interface Master.

A. General

Verify if declared standard Bus Status Display Indicators conform to referenced specification.

B. Test Set-up

1. Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. Apply Auxiliary Power to the Test Product (if auxiliary power used).
2. Verify ***Flashing Red*** indication is per specified timing – if Red indicator declared.
3. Apply bus power.
4. Verify ***Steady Red*** indication – if Red indicator declared.
5. Run autobaud (5.5.3.1).
6. Verify ***Steady Green*** indication – if Green indicator declared.
7. Read any attribute repeatedly.
8. Verify ***Flashing Green*** indication is per specified timing – if Green indicator declared.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

Flashing indications shall be 0.5 seconds ON and 0.5 seconds OFF. The reference specification provides a more detailed specification.

Analysis: None

Check List 5. Basic Environmental Dynamic Test

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
5.3.4	Basic Environmental Dynamic Tests		
5.3.4.1	**ElectroMagnetic Interference Fast Transient Burst Test**	**@ 0.5kV:** **req/resp message counts match?** **Cont's to operate?** **No chg op'g state?** **No chg str'd data?** **Recovers funct'y?** **1.No added msg's?** **No drop'd msg's?** **2.No lock-up?** **3.No I/O point un-expected chg's?** **If I/O changes, f. pulse < 1μs?** **4.No chg: analog?** **5.No chg: digital?** **6.No device reset?** **7.No selftest fail?**	 **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___**
5.3.5	**Bus Status Display Indicator Test**	**1.Flashing RED ok?** **2.Steady RED ok?** **3.Steady GREEN ok?** **4.Flashing GREEN ok?**	**(Y/N) ___** **(Y/N) ___** **(Y/N) ___** **(Y/N) ___**

5.4 Data Link Layer Dynamic Test

There are no specific dynamic Data Link tests due to the fact that the CAN chip incorporates this protocol layer.

Verify functionality via the Autobaud test (paragraph 5.5.3.1).

NOTE: There is a Critical Parts List check in paragraph 4.4, Data Link Layer Static Test.

5.5 Application Layer Dynamic Test

5.5.1 ALP Services

This section covers all ALP Services. **Verify those which are supported by the *Test Product***. Verification must include (*Reference /3/*, Application Layer Protocol Specification, Section 4):

Message format checks
Verify that the data, for each message field, is within the specified range:

All Messages
Dir/Pri {0 - 1}
Device ***Logical Address*** {0 - 125}
RTR {0}

Short Form Messages
Service Type {0 - 7}
DLC {0}

Long Form Messages
Service Type {4 - 7}
DLC {>0}
R/R {0 - 2}
FI {0}
EOID {0 - 15}
Service Parameters {0 - 255}

Fragmented Messages
Service Type {4 - 7}
DLC {>0}
R/R {0 - 2}
FI {1}
EOID {0 - 15}
Service Parameters {0 - 255}
Fragment Number {0 - 63}
Total Fragmented Bytes {7 - 255}

Message structure checks
Verify proper message structure (e.g. short form response for short form request).

Product reaction to double messages
Verify a single response for each request (at least two requests - minimize delay between requests).

Multiple Product response checks
Verify single response, only, from Product when presented a single request.

Decoding checks
Verify proper decoding of message fields (e.g. Attribute ID).

5.5.1.1 Message Response Time

Specification: *Reference /3/*, Application Layer Protocol Specification, Section TBD

Necessary Equipment, etc: 1. ***Smart Distributed System*** Bus Monitor
2. Oscilloscope

A. General

Verify the maximum Response Time (without bus traffic) of the ***Test Product***.

B. Test Set-up

1. Set-up a repetitive Action NOOP Request without any unsolicited messages (loop time < 1.0 seconds - this will eliminate transmission of any Heartbeat messages from the ***PUT***).
2. Verify the set-up with the monitor.
3. Set-up the oscilloscope to measure the time between completion of the request message and the beginning of the response message.

C. Test Steps

1. Initiate the Action NOOP Request sequence.
2. Observe at least 10 repetitions of the request–response sequence and measure the longest observed Test Product Response Time (i.e. from Action NOOP Request to Action NOOP Response).

D. Test Pass Criteria / Analysis

Test Pass Criteria: Response Time is less than or equal to the maximum specified value.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.2 COS ON

This section applies ONLY to Single Binary I/O (Models 1.1 and 1.3) and Multiple Binary I/O (1.10) where a single input and a single output is specified.

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for COS ON.

B. Test Set-up

Set Logical Device UnSolicited Mode, if necessary.

C. Test Steps

Initiate COS ON message as specified by Partner documentation.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Test Product issues the COS ON message.
2. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.3 COS OFF

This section applies ONLY to Single Binary I/O (Models 1.1 and 1.3) and Multiple Binary I/O (1.10) where a single input and a single output is specified.

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for COS OFF.

B. Test Set-up

Set Logical Device UnSolicited Mode, if necessary.

C. Test Steps

Initiate COS OFF message as specified by Partner documentation.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product issues the COS OFF message.
2. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.4 Write ON

This section applies ONLY to Single Binary I/O (Models 1.1 and 1.3) and Multiple Binary I/O (1.10) where a single input and a single output is specified.

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Write ON.

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

Issue a Write ON Request message to the Test Product.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product answers with a Write ON ACK.
2. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.5 Write OFF

This section applies ONLY to Single Binary I/O (Models 1.1 and 1.3) and Multiple Binary I/O (1.10) where a single input and a single output is specified.

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Write OFF.

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

Issue a Write OFF Request message to the Test Product.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product answers with a Write OFF ACK.
2. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.6 Read

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Read.

B. Test Set-up

Optional: Issue a Write message to initialize the target Attribute (if Attribute is R/W).

C. Test Steps

Issue a Read Request message, with the selected Attribute ID, to the Test Product.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product answers with a Read Response.
2. Optional: The returned data properly represents the selected Attribute data.
3. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.7 Write

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Write.

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

1. Issue a Write Request message to the Test Product.
2. Optional: Issue a Read Request message to confirm data written.

Note: Repeat all steps varying the data to correspond to observable output states, as necessary to confirm proper transfer of all data bits.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product answers with a Write Response.
2. Optional: Read Response data matches write data.
3. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.8 Action

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Action.

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

Issue an Action Request message, with selected Action ID, to the Product.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product answers with an Action Response message.
2. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.9 Event

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Event.

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

Initiate selected Event as specified by Partner Product documentation.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product issues an Event Request message with the proper Event ID.
2. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.10 Fragmented Write

Specification: *Reference /3/*, Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Fragmented Write.

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

1. Issue a Fragmented Write Request, with more than 6 bytes of data, to the Test Product (i.e. multiple Fragmented Write Request messages) to selected Attribute ID.
2. Optional: send a Read Request message to selected Attribute ID.

Repeat all Steps, varying the overall fragmented data length.

Note: Critical lengths corresponding to fragmentation boundaries include: 6, 7, 8, 9, 12, 13, etc.
The DLC, of the last message of each fragmented message group, is also critical.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product answers with a single Write Response.
2. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.11 Fragmented Action

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Fragmented Action.

B. Test Set-up

Initialize the ***Test Product***, if necessary, to enable the fragmented action selected for this test.

C. Test Steps

1. Issue the Fragmented Action Request, with the selected Action ID, to the Product.
2. Repeat Step 1., varying the overall fragmented data length.

Note: Critical lengths corresponding to fragmentation boundaries include: 6, 7, 8, 9, 12, 13, etc.
The DLC, of the last message of each fragmented message group, is also critical.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product answers with a single Action Response message.
2. All of the applicable items in paragraph 5.5.1, ALP Services, verified.

Analysis: As necessary to verify the items in paragraph 5.5.1.

5.5.1.12 Fragmented Event

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify ALP for Fragmented Event.

B. Test Set-up

Initialize the ***Test Product***, if necessary, to enable the Fragmented Event selected for this test.

C. Test Steps

1. Initiate the selected Event as specified by the Product documentation.
2. Observe if Test Product issues the Fragmented Event request messages.
3. Repeat all steps, including set-up, varying the overall fragmented data length, if possible.

Note: Critical lengths corresponding to fragmentation boundaries include: 6, 7, 8, 9, 12, 13, etc. The DLC, of the last message of each fragmented message group, is also critical.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product responds with multiple Fragmented Event Request messages.
2. Each fragmented message is properly formed:
   a. Fragment bit = 1.
   b. Fragment Numbers are correct (i.e. sequential starting with '0').
   c. Data Length Codes correspond to actual message data lengths.
3. All of the applicable items in paragraph 5.5.1, ALP Services, verified.
4. The composite data from the group of Fragmented Event Request messages is exactly the same as the actual Product data represented.

Analysis: As necessary to verify the items in paragraph 5.5.1.

Check List 6. ALP Services

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
5.5.1	ALP Services		
5.5.1.1	Message Response Time	Response Time Meas: Resp. Time ≤ 5 msec?	_____ msec (Y/N) __
5.5.1.2	COS ON	COS ON issued? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.3	COS OFF	COS OFF issued? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.4	Write ON	Write ON ACK? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.5	Write OFF	Write OFF ACK? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.6	Read	Read Response? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.7	Write	Write Response? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.8	Action	Action Response? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.9	Event	Event Request? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.10	Fragmented Write	Write Resp ok? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.11	Fragmented Action	Action Resp ok? 5.5.1 items ok?	(Y/N) __ (Y/N) __
5.5.1.12	Fragmented Event	Ea Frag Event ok? 5.5.1 items ok?	(Y/N) __ (Y/N) __

5.5.2 Logical Device Functions

5.5.2.1 Address

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: Device Conformance Tester or equivalent.

A. General

Verify that the ***Test Product*** responds to the correct address(s) and no other address.

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

1. Issue a Read Request message, with a valid Attribute ID, to the Test Product address(s).
2. Observe Product's response.
3. Issue Read Request messages, with valid Attribute ID, to every ***User Address*** (1 - 126), except the address(s) of the Test Product.
4. Observe the Product's responses (if any).

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. Product's response to its address is a Read Response message.
2. Product's response to all other addresses is no response.

Analysis: If any responses to any address(s) that are not assigned to the Test Product, capture any relevant information and/or analysis.

5.5.2.2 Attributes

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: Device Conformance Tester or equivalent.

A. General

Issue individual Read and Write Request messages with all possible Attribute ID's (0 - 255).

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

1. For each possible Attribute ID (0 - 255), issue a Read Request message.
2. Observe the Product's response to each Read Request.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. All Response messages are valid (i.e., Attribute exists).
2. All Error messages are valid (i.e., Attribute does not exist).
3. There is a response (normal or valid error) for each request.

Analysis: If any incorrect or unexpected responses from the Test Product, capture any relevant information and/or analysis.

5.5.2.3 Actions

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: Device Conformance Tester or equivalent.

A. General

Issue individual Action Request messages for all possible Action ID's (0 - 255).

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

1. For each possible Action ID (0 - 255), issue an Action Request message.
2. Observe the Product's response to each Action Request.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. All Successful Response messages are valid (i.e. Action exists).
2. All Error Response messages are valid (e.g. Action does not exist).
3. There is a response (normal or valid error) for each request.

Analysis: If any incorrect or unexpected responses from the Test Product, capture any relevant information and/or analysis.

5.5.2.4 Events

Specification: *Reference /3/*, Application Layer Protocol, Section 4

Necessary Equipment, etc: Device Conformance Tester or equivalent.

A. General

For each Event included in the Component Model, verify that the ***Test Product*** issues an Event Request message with the proper Event ID when the Product is stimulated as specified to produce a specific Event.

B. Test Set-up

As necessary to enable each Event (see Product documentation).

C. Test Steps

1. Stimulate the Test Product as necessary to produce each Event specified in the Component Model.
2. For each expected Event, observe any response from the Product.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. For each expected Event, the Product issues an Event Request with the proper Event ID.
2. No unexpected Product Event requests.

Analysis: If any incorrect or unexpected responses from the Test Product, capture any relevant information and/or analysis.

Partner Name: **Date:**
Partner ID: **Verification No:**
Product Name: **Certified Test Agent:**
Catalog Listing:

Check List 7. Logical Device Functions

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
5.5.2	Logical Device Functions		
5.5.2.1	**Address(s)**	**Resp - Prod Add(s)?** **NO Resp other Adds?**	**(Y/N) __** **(Y/N) __**
5.5.2.2	**Attributes**	**Resp - all Attr's?** **Error resps valid?** **Resp - all A. IDs?**	**(Y/N) __** **(Y/N) __** **(Y/N) __**
5.5.2.3	**Actions**	**Resp - all Act's?** **Error resp's valid?** **Resp - all A. IDs?**	**(Y/N) __** **(Y/N) __** **(Y/N) __**
5.5.2.4	**Events**	**Request f. ea. Event?** **No unexpected Product Events?**	**(Y/N) __** **(Y/N) __**

5.5.3 Network Functions

5.5.3.1 Autobaud

Specification: *Reference /6/*, Control Interface Specification

Necessary Equipment, etc: Control Interface Master

A. General

To verify the Autobaud process in a ***Common I/O Device***, it is necessary to use a ***Control Interface*** Master that properly implements Autobaud (*Reference /6/*).

Initiate the Autobaud sequence from the master at least 3 times for each baud rate. The master must enroll the ***Test Product*** during each of these Autobaud sequences (when correct set-up is established and correct procedure is followed).

Repeat the Autobaud test for each of the required baud rates, run Autobaud with the Test Product ***User Address*** set to:

1. address 1
2. one address within the range (10 - 110)
3. address 126

B. Test Set-up

1. Figure 10, Device Conformance Test Set-up.
2. Turn auxiliary power ON (if Product uses auxiliary power).
3. Turn bus power ON.
4. Set DCT Autobaud Address = 9. **Note: this value must be used for all Autobaud tests.**
5. Initiate Autobaud from the Device Conformance Tester (to determine device address).
6. Set initial device address.

C. Test Steps

Products with the Optocoupled Transceiver must autobaud at 125/250/500 KBaud. Products with any other Transceiver must autobaud at 125/250/500/1000 KBaud.

1. Turn auxiliary power ON (if Product uses auxiliary power) and leave ON for remainder of test.
2. Turn bus power OFF.
3. Turn bus power ON.
4. Initiate Autobaud from the Device Conformance Tester.
5. Observe any Autobaud addresses displayed.
6. Set next device test address and/or baud rate.
7. Repeat steps 2. through 6. for each Autobaud test changing the baud rate after each set of three.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Test Device address(s) must be recognized by the Autobaud process.
2. All of the Autobaud tests must finish without any CAN Error Status (82C200 Status Register, bit 6, ES) at the Device Conformance Tester.

NOTE: The Honeywell Device Conformance Tester displays "CAN Error Status" in the System Transcript window when this bit is set.

Analysis: None

5.5.3.2 Fixed Baud Rate

This section applies ONLY when Fixed Baud Rate(s) are specified in the Component Model.

Specification: *Reference /6/*, Control Interface Specification

Necessary Equipment, etc: Control Interface Master

A. General

To verify Fixed Baud Rate(s) in a ***Common I/O Device***, it is necessary to use a ***Control Interface*** Master that properly implements Autobaud (*Reference /6/*).

Initiate the Autobaud sequence, with the same Baud Rate that the ***Test Product*** has configured. The Test Product must remain inactive until it sees a request message for its address. After autobaud, the Test Product must function normally. This test is repeated for each valid Baud Rate.

B. Test Set-up

Figure 10, Device Conformance Test Set-up

C. Test Steps

1. Turn bus power OFF.
2. Turn bus power ON.
3. Monitor message traffic - look for any messages from the Test Product between power ON and Autobaud.
4. Initiate Autobaud.
5. Issue a Read Request message with Attribute ID set to 4 (***Logical Address*** List).
6. Repeat steps 1. through 5. for each valid Baud Rate.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Test Product must not issue any messages prior to receiving a request message with the Product's address.
2. The Product responds with a Read Response message with the Product address(s).

Analysis: None

5.5.3.3 HeartBeat

This section applies ONLY when the HeartBeat option is specified in the Product Model.

Specification: *Reference /6/*, Interface Guidelines, Section 5.4

Necessary Equipment, etc: Test System capable of communicating all of the messages which are needed to verify the Test Product's conformance to the approved Component Model.

A. General

If the Heartbeat behavior (periodic message to report "health"), is specified for the ***Test Product***, this test will verify its existence and repetition.

B. Test Set-up

See Figure 10, Device Conformance Test Set-up.

C. Test Steps

1. First, enable the heartbeat (if selectable).
2. Initiate the heartbeat by not sending any messages to the Test Product (and meeting any other conditions that may be specified in the Product documentation).
3. Monitor the bus to observe the heartbeat messages (long form Action NOOP) and message repetition rate.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. Heartbeat messages are produced under the conditions specified in the Product documentation.
2. Heartbeat messages are long form Action NOOP requests.
3. Heartbeat messages repeat as specified in the Product documentation.

Analysis: None

Partner Name: **Date:**
Partner ID: **Verification No:**
Product Name: **Certified Test Agent:**
Catalog Listing:

Check List 8. Network Functions

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
5.5.3	Network Functions		
5.5.3.1	Autobaud 125 K, add 1	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	add (10)	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	add 126	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	256 K, add 1	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	add (10)	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	add 126	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	512 K, add 1	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	add (10)	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	add 126	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	1 M, add 1 *Not req'd for Optocoupled Transceiver*	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	add (10) *Not req'd for Optocoupled Transceiver*	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
	add 126 *Not req'd for Optocoupled Transceiver*	address(s) found? no CAN Err Status?	(Y/N) ___ (Y/N) ___
5.5.3.2	Fixed Baud Rate -ea valid Baud R.-	Waits for address? Read response with Product address?	(Y/N) ___ (Y/N) ___
5.5.3.3	HeartBeat	HB messages? Action NOOPs? Repetition OK?	(Y/N) ___ (Y/N) ___ (Y/N) ___

5.6 System Dynamic Test

The Product Under Test (PUT) will be placed in a ***Smart Distributed System*** application to determine if any undesirable interactions with other devices occur. If a failure is found, the message traffic captured when the failure occurred will be provided to the Partner as part of the test report.

5.6.1 Non-Participative System Testing

The ***Test Product*** will be placed in a system similar to that shown in Figure 16.

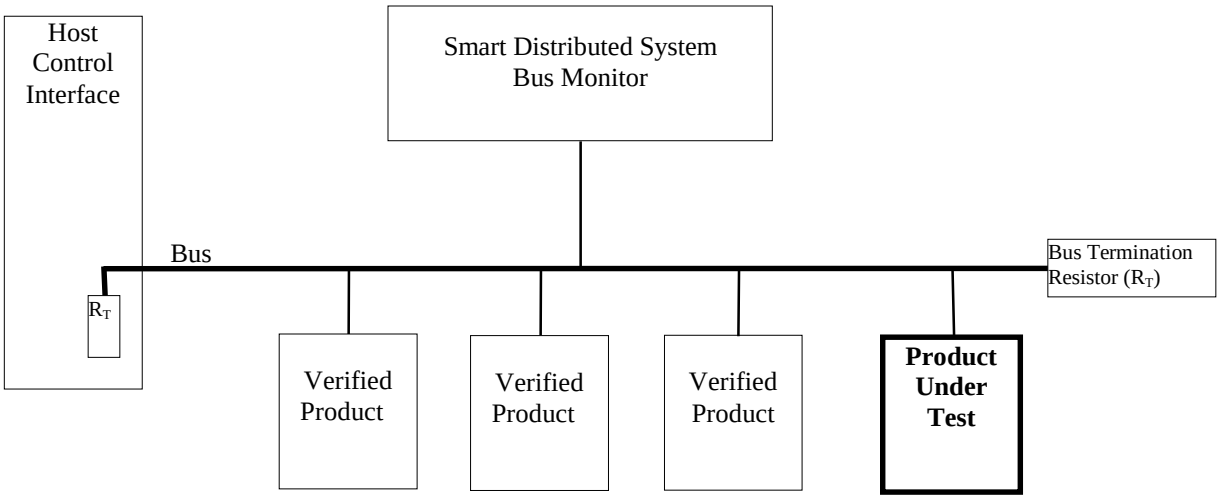


Figure 16. System Test Set-up

Specification: *Reference /6/*, Control Interface Specification

Necessary Equipment, etc:

1. Bus Message Monitor
2. Control Interface Master
3. SDS application designed to selectively include the Test Product

A. General

Verify Test Product has no effect when connected into a system which does not include the PUT in its application program. The Control Interface Master device is allowed to have limited interaction with the PUT during its network initialization (e.g., autobaud, enrollment) and during execution of the application (e.g., acknowledgement of unsolicited I/O messages).

B. Test Set-up

Set-up is as shown in Figure 16, with the application program and several additional ***Common I/O Devices***.

C. Test Steps

1. Record the system configuration.
2. Set the Test Product address to a value which is outside the domain of the application program.
3. Autobaud the system.
4. Monitor the bus during and shortly after autobaud and save message stream to a log file.

D. Test Pass Criteria / Analysis

Test Pass Criteria: The Product does not cause any disruption on the bus or attempt to communicate any messages in response to the other products.

Analysis: Analyze trace files, with and without Test Product present. The only differences should be autobaud response(s) from the Test Product and possibly a heartbeat from the Test Product, if one is specified and if it is enabled.

5.6.2 Participative System Testing

Specification: *Reference /6/*, Control Interface Specification

Necessary Equipment, etc:

1. Bus Message Monitor
2. Control Interface Master
3. SDS application designed to selectively include the Test Product

A. General

Verify ***Test Product*** has no unexpected effect when connected into a system which addresses it to access one or more of its services.

B. Test Set-up

Set-up is as shown in Figure 16, with the application program and several additional Control Components.

C. Test Steps

1. Set the Test Product address to a value which is within the domain of the application program.
2. Autobaud the system.
3. Monitor the bus during and shortly after autobaud and save to a log file.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product does not cause any disruption on the bus or attempt to communicate any messages in response to the other products.
2. The Product responds to messages with its address.

Analysis: Analyze log file, to verify that the only messages involving the Test Product are autobaud response(s) from the Test Product, possibly a heart beat from the Test Product, the specific application Request messages to the Test Product and the Response messages from the Product.

5.6.3 System Interoperability with other Controller

Specification: *Reference /6/*, Control Interface Specification

Necessary Equipment, etc:

1. Bus Message Monitor
2. Control Interface Master
3. SDS application designed to selectively include the Test Product

A. General

Repeat Participative Test (5.6.2) with a different Control Interface.

B. Test Set-up

Set-up is as shown in Figure 16, with the application program and several additional Control Components.

C. Test Steps

1. Set the Test Product address to a value which is within the domain of the application program.
2. Autobaud the system.
3. Monitor the bus during and shortly after autobaud and save to a log file.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. The Product does not cause any disruption on the bus or attempt to communicate any messages in response to the other products.
2. The Product responds to messages with its address.

Analysis: Analyze log file, to verify that the only messages involving the Test Product are autobaud response(s) from the Test Product, possibly a heart beat from the Test Product, the specific application Request messages to the Test Product and the Response messages from the Product.

5.6.4 Other Basic System Testing

5.6.4.1 Power ON

Specification:

Necessary Equipment, etc: ***Smart Distributed System*** Bus Monitor

A. General

Verify that the ***Test Product*** does not issue any messages, between power-up and the first request message to the Test Product address, during the Autobaud sequence.

B. Test Set-up

Turn bus power OFF.

C. Test Steps

1. Turn bus power ON.
2. Observe Bus Monitor for any messages issued from the Product for at least 10 seconds.

D. Test Pass Criteria / Analysis

Test Pass Criteria: No messages issued from Test Product.

Analysis: None

5.6.4.2 Unexpected Messages

Specification: *Reference /3/,* Application Layer Protocol Specification, Sections 4-6

Necessary Equipment, etc:

1. ***Smart Distributed System*** Bus Monitor
2. Component Model

A. General

Verify that the ***Test Product*** does not issue any unexpected (unspecified) messages during any of the Verification Tests specified in this document.

B. Test Set-up

Each Verification Test has its own Set-up.

C. Test Steps

During each communication related Verification Test, monitor the bus for unexpected messages.

D. Test Pass Criteria / Analysis

Test Pass Criteria:

1. No unexpected messages, or
2. Analysis determined the unexpected messages are valid, or
3. Analysis determined the unexpected messages are harmless - Conditional Pass.

Analysis: In case of receiving any unexpected messages, analyze the messages for 1) message type, etc., 2) possible validity, and 3) possible harmful effects to a ***Smart Distributed System*** application.

Partner Name: **Date:**
Partner ID: **Verification No:**
Product Name: **Certified Test Agent:**
Catalog Listing:

Check List 9. System Dynamic Tests

Item No.	Item Name/Description	Test Success Criteria	Test Results/Comments
5.6	System Dynamic Test		
5.6.1	Non-Participative System Test	No interference?	(Y/N) __
5.6.2	Participative System Test	No interference? Responds to add?	(Y/N) __ (Y/N) __
5.6.3	System Interoperability	OK w. other controller?	(Y/N) __
5.6.4.1	Power ON	No messages?	(Y/N) __
5.6.4.2	Unexpected Messages NOTE 1	All msg's expected? U. msg's valid? U. msg's "safe"?	(Y/N) __ (Y/N) __ (Y/N) __

Note 1: If unexpected messages are observed, identify and fully document the test and test conditions, including a log file showing the message trace surrounding the unexpected message.

If the unexpected messages are, upon further analysis, valid, then the test result is pass.

If the unexpected messages are not valid, but seem to be "safe", this information can be communicated to the Partner. However, any unresolved unexpected messages constitute a test failure.

6. Completion of Tests

In all cases, a test report, reflecting the results of the testing, will be published by the ***Certified Test Agent***. In the case of a test failure, the test report will normally be completed - only up to the point where the failure occurred, according to the Test Plan which is agreed to by both the Partner and the Certified Test Agent. However, if all testing is successful, the test report will show the complete test results.

6.1 Successful Completion of Tests

Upon successful completion of all tests:

1. The Test Agent will advise the ***Smart Distributed System*** Partner of the test results immediately and send the formal Test Report to the Partner within 30 days.

2. Upon request of the Partner, the new product information will be added to the Partner's Product Catalog and other ***Smart Distributed System*** information sources.

3. The Partner has the right to use the caption:

Smart Distributed System
Compatibility
verified by a
Certified Test Agent

on the verified ***Product*** and/or packaging, and in any advertising of the verified Product, for a period of three years.

Similar captions which include the name and/or logo of the Certified Test Agent may be used with the approval of the Test Agent.

6.2 Unsuccessful Completion of Tests

If a failure occurs, the testing may be stopped if specified by the Test Plan or if the failure is critical in the judgement of the Test Agent. In this case, the Test Agent will discuss the test failure with the Partner and the Partner will be responsible for taking corrective action and resubmitting the ***Product*** for complete testing. The Test Agent decides whether the complete series of tests will have to be conducted on the resubmitted product (i.e. if testing must be restarted from the beginning).

All communications, concerning any test failures, are strictly confidential – between the Test Agent and the Partner.

6.3 Test Report

The Test Agent is responsible for completing a Verification Test Report upon completion (successful or unsuccessful) of the Verification Testing. The Test Agent sends the confidential Test Report to the Partner who requested the Verification Test. The Test Report must be completed and sent to the Partner within 30 days of test completion. The Test Report must include the following items. Summary items are automatically included while other items are included at the request of the Partner. Public items have unlimiited distribution when released in writing by the Partner. Private items must not be disclosed - without the Partner's specific written release for each item.

Report Item	Summary Item	Public Item	Private Item
Baseline Issue Number	✔	✔	
Certified Test Agent Name & Number	✔	✔	
Checklists - copies	✔		✔
Component Model Number(s)	✔	✔	
Component Type	✔	✔	
DCT/Monitor Log File - copies			✔
Initialization Time (Max)	✔	✔	
Partner Name and ID Number	✔	✔	
Partner Supplied Documentation - copies			✔
Product Family Name / Reference	✔	✔	
Product Name & Catalog Listing	✔	✔	
Product Serial Number	✔		✔
Re-Test Classification (Verification renewal, product change, complaint resolution, etc.)	✔		✔
Software Version Number	✔	✔	
Verification Test Failures - Brief Report	✔		✔
Verification Test Failures - Complete Report and documentation			✔
Verification Test Failures - Recommended Actions	✔		✔
Verification Test Number	✔	✔	
Verification Test Plan - copy	✔		✔
Verification Test Result - Success or Failure	✔	Success	Failure
Verification Test Start/Completion Dates	✔	Compl'n	Start
Verification Test Summary and Special Notes	✔		✔
Verification Test Type - I/O, Controller, etc.	✔	✔	

Figure 17. Verification Test Report Items

When a written release is received from the Partner, for the Public Items, these Public Verification Test results: 1.) must be provided to Honeywell, MICRO SWITCH by the Test Agent, 2.) can be published by the Test Agent, and 3.) will be made available to the public through various avenues.

7. Verification Status Record

The Verification Status Record is the formal record of ***Smart Distributed System*** Verification Testing results for a Partner ***Product***. Upon request by the Partner to the Test Agent, the VSR is "released" into the public domain. VSRs are a vehicle for communicating all ***Smart Distributed System***, product related, Verification Testing public summary results without any restrictions. The purpose of this vehicle is promote the general availability of product verification information to users and potential users - to provide an open channel for selecting the ***Smart Distributed System*** products best suited to their applications.

An example of how a VSR might appear on the Internet is shown in Appendix I.

ATTRIBUTE INFORMATION FORM

Network Data Descriptor & Predefined Data Values

(see *Reference /7/*, Component Modeling Specification)

Attribute ID	Description	Variable Type	Size	Actual Length	R/W	Password Protected	Actual Range	Primitive Tag	Predefined Data Values
0	NDD Attribute ID (Input)								18
	Attribute Primitive Tag	0	2	1	R	N	0 – 65,535	0x0040	0x0040
	NDD Attribute ID (Output)								19
	Attribute Primitive Tag	0	2	1	W	N	0 – 65,535	0x8040	0x8040

PRIMITIVE TAG INFORMATION FORM

(see *Reference /7/*, Component Modeling Specification)

Attribute ID	Description	Variable Type	Size	Actual Length	R/W	Password Protected	Actual Range	Primitive Tag	Default Attribute Contents
1	Baud rate	Unsigned	Byte	1	R	N	0...4	0x0020	0
2									
3	Partner ID number	Unsigned	Word	1	R	N	0...65535	0x0040	
4	Logical address	Unsigned	Byte	1	R	N	0...125	0x0020	126
5									
6									
7	Software version	ASCII	Undefined	12	R	N		0x070b	
8	Diagnostic error counter	Unsigned	Byte	1	R	N	0...255	0x0020	0
9	Diagnostic error register	Unsigned	Byte	1	R/W	N	0...255	0x8020	0
10									
11	Serial number	Unsigned	Long	1	R	Y	1...4,294,967,295	0x0060	
12	Date code	ASCII	Undefined	4	R	Y		0x0703	"mmyy"
13	Catalog listing	ASCII	Undefined	24	R	N		0x0717	
14	Partner name	ASCII	Undefined	14	R	N		0x070d	
15	Component tag name	ASCII	Undefined	24	R	Y		0x0717	

ACTION INFORMATION FORM

(see *Reference /7/*, Component Modeling Specification)

Action ID	Description	Request Data Parameters	Request Data Parameter Type	Response Data Parameters	Response Data Parameter Type
0	No Operation	None		None	
1	Change address	New Address Device ID Partner ID Serial Number	Unsigned 8 Unsigned 8 Unsigned 16 Unsigned 32	None	
2	Self Test	None		None	
3 - 5	Unused				
6	Clear all errors	None		None	
7	Unused				
8	Enroll Logical Device	None		Serial Number Partner ID	Unsigned 16 Unsigned 32
9 - 50	Unused				
51	Unused				
52	Unused				
53	Read primitive tag	Attribute ID	Unsigned 8	Attribute ID Primitive tag	Unsigned 8 Unsigned 32
54	Unused				
55	Unused				
56	Unused				
57	Password	Password number	Unsigned 8	None	

EVENT INFORMATION FORM

(see *Reference /7/*, Component Modeling Specification)

Event ID	Description	Output Data Parameters	Output Data Parameter Type
0	Diagnostic event counter	Counter value	Unsigned 8
1	Unused		
2	Unused		
3	End of timer	Attribute ID Data	Unsigned 8 Unsigned 16
4	Unused		
5	Unused		
6	Change of value	Attribute ID Data	Unsigned 8 Unsigned 8,16, or 32

PRODUCT MODEL

			PARTNER PRODUCT MODEL DATA - ENTER IN THESE COLUMNS				
Item Name	**General Specification & Paragraph No.**	**Options or Product Specification**	**Select**	**Documentation or Reference No.**	**Doc. Date**	**Supplier Name**	**Part No.**
Transceiver Type	**/4/ 3.2.4.1**	**Discrete**	X	ABC-1234	12/12/95		
	/4/ 3.2.4.2	**Integrated**					
	/4/ 3.2.4.3	**Optocoupled**					
Transceiver Schematic	**/8/ 3.2.1**			ABC-3567	11/30/95		
CAN Controller Bit Timing	**/9/ 2.1.3**	**Approved Config.**	X	ABC-1256	1/12/96		
		New Configuration					
CAN Controller Population	**/4/ 3.2.1**	**single**	X				
		multiple					
Connector Type	**/4/ 3.3.1.3.2.1**	**Male Mini**	X	ABC-1256	1/12/96	Connector Co.	MMC-001
	/4/ 3.3.1.3.2.1	**Male Micro**					
	/4/ 3.3.1.3.2.3	**Male DB-9 D-Sub**					
	/4/ 3.3.3.1.3	**Terminal Strip**					
	/4/ 3.3.1.3.3.3	**Individual Terminals**					
	/4/ 3.2.5	**Pigtail (wire)**					
Connector Drawing	**3.3.3**			ABC-0011	3/2/96		
Critical Parts List	**3.3.8**			ABC-0112	2/28/96		
Functional Test Diagram	**3.3.5**			ABC-2325	1/17/96		
Functional Test Specification	**3.3.6**			ABC-3398	4/7/96		
Product Specification	**3.3.7**			ABC-3387	4/12/96		
Maximum Supply Current	**3.2**	**12.7 ma**		ABC-2778	3/22/96		
Auxiliary Power			**X**				
Description of Services	**3.2**			ABC-8898	4/24/96		
HeartBeat	**/6/ 5.4**		X	ABC-8898	4/24/96		
Initialization Time		**500 msec**					
Status Display Indicators	**/4/ 3.1.7**	**Red**	**X**	ABC-8911			
		Green	**X**	ABC-8911			
Software Version	**/7/ 7.0**	**2.1**		ABC-6523	3/19/96		
Component Model Number	**3.3.2**	**1.10.2.1.2**		ABC-0212	11/2/95		
Network Data Descriptor	**/7/ 5.0**	**18, 0x011F; 34, 0x811F**		ABC-0212	11/2/95		

NETWORK DATA DESCRIPTOR WORK SHEET

Description	I/O	Next	Reserved	Type	Res	Size	Count
Decimal Value			0		0		
Binary Value			0 0 0		0		
Hexadecimal Value							

Instructions:

Fill in the decimal values for each of the 5 descriptions per SDS Specification GS 052 107

Convert the decimal value to binary for each of the 5 descriptions.

Convert the binary value to hexadecimal for each nibble (each group of 4 bits).

EXAMPLE:

Description	I/O	Next	Reserved	Type	Res	Size	Count
Decimal Value	1	0	0	1	0	0	17
Binary Value	1	0	0 0 0	0 0 1	0	0 0	1 0 0 0 1
Hexadecimal Value	8			1		1	1

This data descriptor describes a 16 point Boolean output.

PRIMITIVE TAG WORK SHEET

Description	R/W	Reserved	Type	Res	Size	Length
Decimal Value		0		0		
Binary Value		0 0 0 0		0		
Hexadecimal Value						

Instructions:

Fill in the decimal values for each of the 5 descriptions per SDS Specification GS 052 107

Convert the decimal value to binary for each of the 5 descriptions.

Convert the binary value to hexadecimal for each nibble (each group of 4 bits).

EXAMPLE:

Description	R/W	Reserved	Type	Res	Size	Length
Decimal Value	0	0	0	0	3	4
Binary Value	0	0 0 0 0	0 0 0	0	1 1	0 0 1 0 0
Hexadecimal Value	0	0		6		4

This primitive tag describes 5 unsigned long read only integers contained in one attribute.

VERIFICATION TEST PLAN Example

Step	VTPS Paragraph No.	VTPS Paragraph Name	Check List No.(s)	Test Plan Notes
1.	4.2.1	Component Model Static Test	4.1	Model No. 1.10.2.7
2.	4.3	Physical Layer Static Test	4.1	
3.	4.4	Data Link Layer Static Test	4.1	
4.	4.5	Application Layer Static Test	4.1	
5.	5.3.1	Transceiver - All	5.2	
6.	5.3.2	Transceiver - Discrete	5.2	
7.	5.3.3	Bus Power	5.3	
8.	5.3.4	Basic Environmental Dynamic Tests	5.4	In middle to verify Product functionality before and after the EMI Test.
9.	5.5.1	ALP Services	5.5	
10.	5.5.3	Network Functions	5.7	
11.	5.5.2	Logical Device Functions	5.6	Perform these test groups together, for
	5.2	Component Model Dynamic Test	5.1	efficiency due to similar test procedures.
12.	5.6	System Dynamic Test	5.8	
13.	6.3	Test Report		

VERIFICATION STATUS RECORD

SUPPLIER	COMPONENT DESCRIPTION	CATALOG LISTING	Certified TEST AGENT	Verification DATE
Honeywell, MICRO SWITCH	Proximity Sensor	SDS-C1-A4HM-A8N	UL, Northbrook	6-12-96
Infranor	Motor Controller		UL, Northbrook	7-15-99
MAC Valve	Valve Manifold		UL, Northbrook	8-22-99
Microscan	Bar Code Reader		UL, Northbrook	8-29-99
Facts Engineering	Remote I/O		UL, Northbrook	9-2-99

Last Page
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