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1. Introduction

1.1 Purpose

This document provides the detailed, step-by-step procedure for conducting Hardware Acceptance Testing (HAT) on the Hydra-C4 Comms Module, herein referred to as the Unit Under Test (UUT). The purpose of this procedure is to formally verify that the UUT meets the physical, functional, and performance requirements as defined in its governing specification, **SS-HYD-SPEC-001**. Successful completion of this procedure is a prerequisite for formal acceptance of the hardware.

1.2 Scope

This procedure applies to all manufactured Hydra-C4 Comms Module units. It is intended for use by trained test personnel in a controlled laboratory environment. The tests defined herein constitute the formal Factory Acceptance Test (FAT) for the hardware component, as outlined in the **SS-TEST-PLAN-001**.

1.3 Test Overview

This procedure encompasses a series of tests:

- **Physical Inspection:** Verifies physical dimensions, weight, and correct installation of connectors and labels.
- **Power-Up and Built-In Test (BIT):** Verifies correct power-up sequence, power consumption, boot time, and the functionality of the internal BIT system.
- **Interface Verification:** Confirms the functionality of all external data, RF, and power interfaces.
- **Performance Verification:** Measures key performance parameters such as data throughput against the specified requirements.

All test results, observations, and any anomalies discovered during the execution of this procedure shall be recorded and managed in accordance with the Defect Management framework defined in **SS-TEST-PLAN-001**.

2. Applicable Documents

- **SS-HYD-SPEC-001:** Hydra-C4 System Specification
- **SS-TEST-PLAN-001:** Test & Evaluation Master Plan (TEMP)

3. Test Prerequisites

3.1 Personnel Requirements

The following personnel are required to conduct this test procedure:

- **Test Conductor:** 1x Certified Test Engineer
- **Quality Assurance Witness:** 1x Synthetic Systems QA Representative

3.2 Unit Under Test (UUT)

- **UUT:** Hydra-C4 Comms Module
- **UUT Serial Number:** _____
- **Firmware Version:** _____

3.3 Required Test Equipment

Equipment	Model / Part Number	Calibration Due Date
DC Power Supply (120V, 10A)	Keysight N5751A	
Digital Multimeter	Fluke 87V	
Network Data Generator/Analyzer	Ixia XG12	
RF Signal Generator (1-6 GHz)	Rohde & Schwarz SMB100A	
RF Power Meter	Anritsu ML2495A	
Test Laptop	SS-ENG-LAP-01	N/A
Calibrated Scale (50kg capacity)	Ohaus Defender 5000	
Calibrated Vernier Calipers	Mitutoyo 500-196-30	
Test Cable Kit	SS-HYD-TC-001	N/A
MIL-DTL-38999 Power Cable	SS-HYD-PC-001	N/A
2x N-Type RF Terminators (50 Ohm)	Pasternack PE6049	N/A

4. Test Procedure

4.1 Section 1: Physical Inspection

Objective: To verify that the UUT conforms to the physical requirements specified in SS-HYD-SPEC-001, Section 3.3.

Step	Action	Expected Result	Pass/Fail
1.1.1	Using the calibrated vernier calipers, measure the height, width, and depth of the UUT chassis.	Height ≤ 8.75", Width ≤ 17.75", Depth ≤ 22.0".	
1.1.2	Using the calibrated scale, measure the weight of the UUT.	Weight ≤ 25.0 kg.	
1.1.3	Visually inspect all external connectors. Verify the presence and correct type for all interfaces.	4x RJ45, 1x RJ45 (Mgmt), N-Type RF connectors, 1x MIL-DTL-38999 Power Connector. All are secure and undamaged.	
1.1.4	Verify that the UUT serial number plate is present, legible, and matches the number recorded in Section 3.2.	Serial number plate is correct and legible.	

Section 1 Result: _____ (PASS/FAIL)

4.2 Section 2: Power-Up and BIT Test

Objective: To verify the UUT powers on correctly, meets power consumption requirements, and that the BIT functions as specified in SS-HYD-SPEC-001, Sections 3.1.10, 3.2.3, and 3.3.3.

Step	Action	Expected Result	Pass/Fail
1.2.1	Connect the DC Power Supply to the UUT via the power cable. Connect the	Connections are secure.	

Step	Action	Expected Result	Pass/Fail
	Test Laptop to the Management Ethernet port.		
1.2.2	Power on the UUT. Using a stopwatch, measure the time from power application until the system status indicator turns solid green.	The UUT is fully operational within 120 seconds.	
1.2.3	With the UUT idle (standby mode), measure the power consumption using the Digital Multimeter.	Power consumption ≤ 50 Watts.	
1.2.4	Access the management interface via the Test Laptop. Initiate the Power-On BIT (PBIT) routine.	PBIT routine completes within 90 seconds with a "PASS" status. No errors are reported.	
1.2.5	Initiate the Initiated BIT (IBIT) routine from the management interface.	IBIT routine completes with a "PASS" status. No errors are reported.	

Section 2 Result: _____ (PASS/FAIL)

4.3 Section 3: Interface Verification

Objective: To verify the basic functionality of all external data and RF interfaces as specified in SS-HYD-SPEC-001, Section 3.5.

Step	Action	Expected Result	Pass/Fail
1.3.1	Connect the Network Analyzer to each of the four 1000BASE-T	For each port, the Network Analyzer confirms a 1 Gbps link	

Step	Action	Expected Result	Pass/Fail
	Ethernet ports in sequence.	is established. Data packets can be sent and received without error.	
1.3.2	Connect the RF Signal Generator to RF Input 1. Connect the RF Power Meter to RF Output 1. Generate a -20 dBm test signal at 2.4 GHz.	The RF Power Meter measures a corresponding signal at the output port (within tolerance).	
1.3.3	Repeat step 1.3.2 for all remaining RF input/output pairs.	All RF ports pass the signal correctly.	
1.3.4	Terminate all unused RF ports with 50 Ohm terminators.	All ports are correctly terminated.	

Section 3 Result: _____ (PASS/FAIL)

4.4 Section 4: Performance Verification

Objective: To verify key performance parameters of the UUT as specified in SS-HYD-SPEC-001, Section 3.1.

Step	Action	Expected Result	Pass/Fail
1.4.1	**Continuous Data Throughput:** Configure the Network Analyzer to send a continuous stream of UDP traffic through the UUT (Port 1 to Port 2).	The UUT sustains a data rate of ≥ 100 Mbps for 5 minutes with < 0.01% packet loss.	
1.4.2	**Burst Data Throughput:** Configure the Network Analyzer to send a burst of UDP traffic through the	The UUT sustains a data rate of ≥ 250 Mbps for the 60-second duration with < 0.01% packet loss.	

	UUT for 60 seconds.		
1.4.3	**Encryption Verification:** From the management interface, enable AES-256 encryption. Repeat step 1.4.1.	The UUT sustains a data rate of ≥ 100 Mbps with encryption active.	
1.4.4	**Max Power Consumption:** While the 250 Mbps burst test (1.4.2) is running, measure the UUT's power consumption.	Power consumption ≤ 450 Watts.	

Section 4 Result: _____ (PASS/FAIL)

5. Test Completion

Upon completion of all test steps, the Test Conductor and Quality Assurance Witness shall sign below to certify the results.

Overall Test Result: _____ (PASS/FAIL)

Test Conductor:

- Name: _____
- Signature: _____
- Date: _____

Quality Assurance Witness:

- Name: _____
- Signature: _____
- Date: _____

Anomalies / Defect Report Numbers: