

**Standard** ECMA-403

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**NFCIP-2 Test Methods**

**Standard**



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## **Introduction**

This Standard specifies test methods for ECMA-352 in addition to those specified in the referenced standards.

This Ecma Standard has been adopted by the General Assembly of June 2013.

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# NFCIP-2 Test Methods

## 1 Scope

This Standard specifies requirements to verify NFCIP-2 mode selection and initial communication in the selected modes. The Test Management Service Data Units and the interface over which they are exchanged are out of scope.

## 2 Conformance

Conforming implementations pass the tests in Clause 6 using the test environment and apparatus as specified in Clause 5.

## 3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ECMA-340 *NFCIP-1 – Near Field Communication Interface and Protocol -1 (ISO/IEC 18092)*

ECMA-352 *NFCIP-2 – Near Field Communication Interface and Protocol -2 (ISO/IEC 21481)*

ECMA-356 *NFCIP-1 - RF Interface Test Methods (ISO/IEC 22536)*

ECMA-362 *NFCIP-1 - Protocol Test Methods (ISO/IEC 23917)*

ISO/IEC 9646 *Information Technology – Open systems Interconnection – Conformance Testing methodology and framework*

ISO/IEC 14443-3 *Identification cards – Contactless integrated circuit cards – Proximity cards – Part 3: Initialization and anticollision*

ISO/IEC 10373-6 *Identification cards – Test methods – Part 6: Proximity cards*

ISO/IEC 10373-7 *Identification cards – Test methods – Part 7: Vicinity cards*

## 4 Acronyms

IUT	Implementation Under Test
LT	Lower Tester
TB-PDU	Transmission Block – Protocol Data Unit
TM-SDU	Test Management – Service Data Unit
UT	Upper Tester

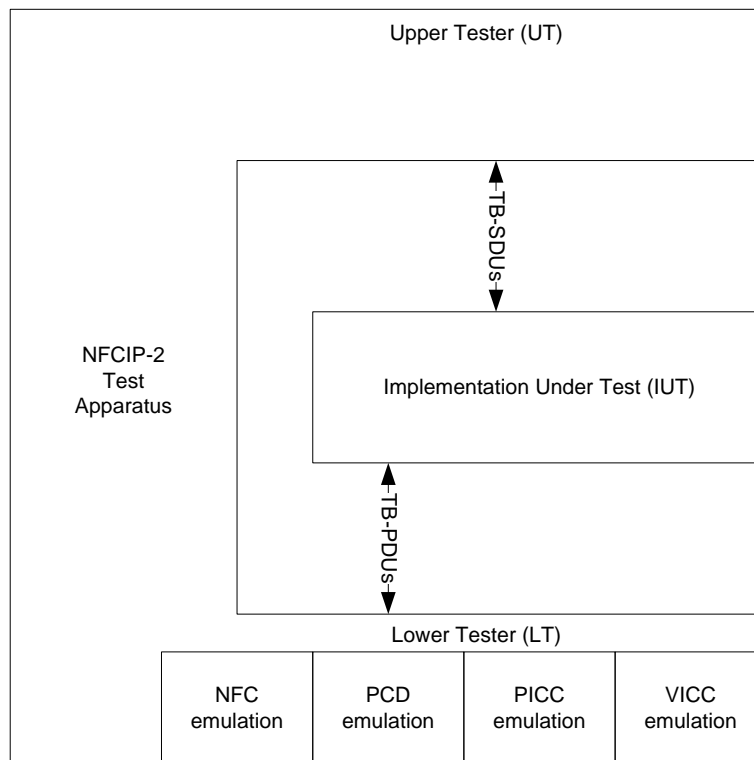
## 5 Test environment and apparatus

The concepts and abstract model of ISO/IEC 9646 are used to verify the operation of an IUT compliant to ECMA-352.

NFCIP-2 test apparatus consists of an Upper Tester (UT) and a Lower Tester (LT) as illustrated in Figure 1.

To communicate with the IUT, e.g. to select modes on the IUT, the UT and IUT exchange TM-SDUs. The SDU definition and the interface between UT and IUT are out of scope of this Standard.

The NFCIP-2 test apparatus implements the specified modes at its LT interface according to the requirements of the test scenarios specified in Clause 6.



**Figure 1 — test configuration**

## 6 Tests

### 6.1 Test External RF Field detection

To verify that the IUT does not switch on its RF field, configure the LT as test circuit and perform the test in 8.1 of ECMA-352 while using the term NFCIP-2 device instead of NFCIP-1 device.

### 6.2 Test Mode selection and switching

#### 6.2.1 Test PICC mode

1. Select PICC mode on the IUT and place it into the operating volume of the LT
2. Select PCD mode on the LT, and let the LT send REQA of ISO/IEC 14443-3,



- 2.1 If the IUT answers with ATQA of ISO/IEC 14443-3 within 1 ms and passes the PICC tests specified in ISO/IEC 10373-6, it passes the test, otherwise
- 2.2 Let the LT send REQB of ISO/IEC 14443-3: if the IUT answers with ATQB of ISO/IEC 14443-3 within 1 ms and passes the PICC tests specified in ISO/IEC 10373-6, it passes the test otherwise it fails the test.

#### **6.2.2 Test NFC mode, Target and Initiator**

1. For NFC, VCD and PCD mode selected on the IUT, place it in the operating volume of the LT and let the LT switch its RF field off for at least 5,1 ms, and select Initiator for Active communication mode, on either *fc/128*, *fc/64* or *fc/32* on the LT, and let the LT send ATR\_REQ of ECMA-340 (see 8.5.1 of ECMA-362).
2. To test step 3 of Clause 7 of ECMA-352, verify that the IUT responds with ATR\_RES of ECMA-340 for all three selected modes.
3. The LT shall switch off its RF field and select NFC mode, Passive communication mode, as a Target on the LT.
4. Select NFC mode on the IUT and verify that the IUT executes one of the Initiator protocols for *fc/128*, *fc/64* or *fc/32* of ECMA-340 as selected (see 9 of ECMA-362).

#### **6.2.3 Test PCD mode**

Use ISO/IEC 10373-6 to verify that the IUT operates in PCD mode with the LT as PICC mode emulator.

#### **6.2.4 Test VCD mode**

Use ISO/IEC 10373-7 to verify that the IUT operates in VCD mode with the LT as VICC mode emulator.

