

UM11061

User Manual PN7150X

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User manual
COMPANY PUBLIC

Document information

Information	Content
Keywords	PN7150X, NFC, NFCC, NCI 1.0, Apple Enhanced Contactless Polling
Abstract	This is a user manual for the PN7150X NFC Controller. The aim of this document is to describe the PN7150X additions to the generic PN7150.



Revision history

Rev	Date	Description
v. 1.2	20180711	Security status changed into "COMPANY PUBLIC"
v. 1.1	20171023	Rewording to avoid confusion
v. 1.0	20170704	First official release
v. 0.1	20170630	Creation of the document

1 Introduction

The PN7150X is a derivate of the PN7150 NFC controller for contactless communication at 13.56 MHz. In addition to all features of the PN7150 it implements the support for Apple Enhanced Contactless Polling.

The current document describes these additions to the PN7150 User Manual (see [Section 3](#)).

For further information please refer to the PN7150 data sheet (see [Section 3](#)).

Please note that Apple and Apple Watch are registered trademarks of Apple Inc.

2 Additions to PN7150

PN7150X implements all PN7150 features. On top of that it adds support for Apple Enhanced Contactless Polling allowing to enable compatibility with Apple watch.

2.1 Apple Enhanced Contactless Polling support

PN7150X implements Apple Enhanced Contactless Polling inserting the VASUP-A command right after Type A passive poll phase of the NFC Forum discovery loop.

PN7150 implements NFC-A Bail-out option (refer to NCI Forum Activity, [Section 3](#)), implying VASUP-A command being only sent out if no answer to the SENS_REQ is observed.

The PN7150X will ignore any response to the VASUP-A command and will continue with the next phase of the polling loop.

Below picture describes PN7150X behavior with respect to NFC Forum activity defined Technology Detection Activity flow chart:

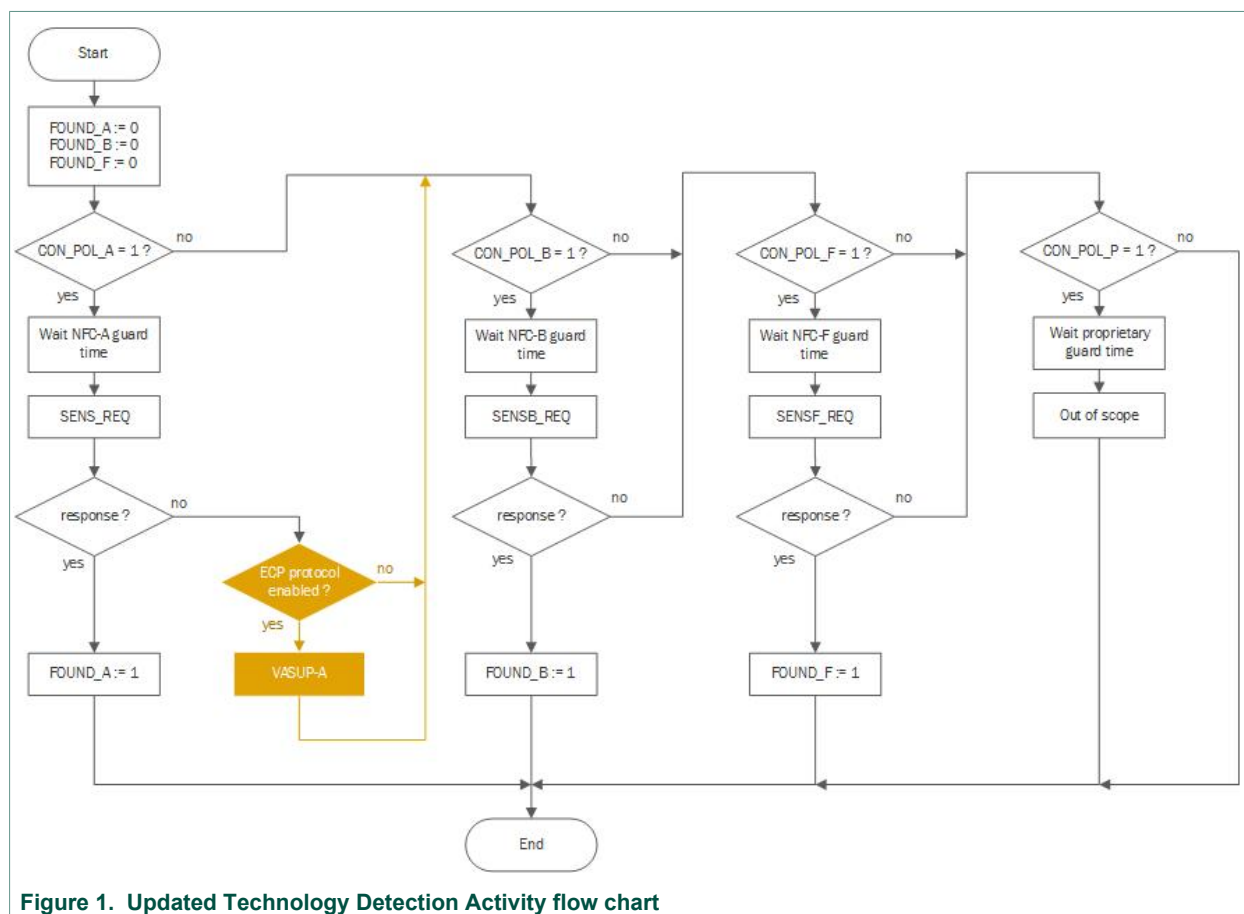


Figure 1. Updated Technology Detection Activity flow chart

As described in above flow chart, the Apple Enhanced Contactless Polling is only handled when Type A polling is activated. When enabled, the VASUP-A command is inserted approximately 780µs after the Type A initial request (SENS_REQ).

2.2 Apple Enhanced Contactless Polling configuration

Apple Enhanced Contactless Polling enable and VASUP-A command configuration is done through the ECP_PROTOCOL_CFG setting. Default value defines ECP disabled.

Table 1. ECP protocol configuration

Name & Rights	Description	Ext. Tag	Len.	Default Value
ECP_PROTOCOL_CFG RW in E²PROM	Sets the detection level. First byte defines the ECP enable (0x6A = enabled, any other value = disabled). Last 4 bytes define the VASUP-A command parameters.	0xA0 0x6B	5	0xFF01000000

2.3 Important considerations

The current implementation of Apple Watch requires special attention to the following points when integrating PN7150X into the counterpart device.

2.3.1 Discovery profile

Interoperability with Apple Watch can only be insured when PN7150X Poll mode discovery loop is set to NFC Forum profile. Indeed, if set in EMVCo profile, the PN7150X won't reset the RF field until it receives a valid response to the ALL_REQ or ALL_REQB request which doesn't allow the Apple Watch to internally enable Type A card emulation after it has seen VASUP-A command.

Discovery loop profile is configured through POLL_PROFILE_SEL_CFG setting described in PN7150 User Manual (see [Section 3](#)). The default value is NFC FORUM profile.

2.3.2 Discovery loop frequency

To insure interoperability with Apple Watch, PN7150X discovery loop must be set with accurate frequency. This is done via NCI standard parameter TOTAL_DURATION described in NFC Forum NCI specification (see [Section 3](#)).

For correct user experience the recommendation is to set this parameter in the range of 250ms (4 POLL phases per seconds), PN7150 default value being 0x03E8 (1s).

2.3.3 Tag Detector

PN7150 integrates a Low Power Card Detector feature (also named Tag Detector) allowing to optimize the power consumption by sensing for environment change to decide if POLL phase of the discovery loop must be run. Considering current Apple Watch implementation, this function must be disabled to allow the Apple Watch enabling internal Type A card emulation after it has seen VASUP-A command.

PN7150 Tag Detector is configured through TAG_DETECTOR_CFG setting described in PN7150 User Manual (see [Section 3](#)). The default value is Tag detector disabled.

3 References

- [1] — UM10936 - PN7150 User Manual
<https://www.nxp.com/docs/en/user-guide/UM10936.pdf>
- [2] — PN7150X product data sheet
<https://www.nxp.com/products/:PN7150X>
- [3] — NFC FORUM Activity Specification 1.0
<http://nfc-forum.org/our-work/specifications-and-application-documents/specifications/nfc-forum-technical-specifications/>
- [4] — NFC FORUM NFC Controller Interface (NCI) Specification 1.0
<http://nfc-forum.org/our-work/specifications-and-application-documents/specifications/nfc-forum-technical-specifications/>

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