Cryptera Payment Solutions

INT3520

Installation Manual

Author: Morten Schmidt
Revision: B
Date: 2020-01-08
Document Number: SV/INT3520-2000-10

1 Abstract

This document provides information on the usage of the NFC Reader from Cryptera.

The generic part number for the product is **INT3520-20xx**, where 'xx' is a two-digit number reflecting a customer specific configuration.

The document describes the overall characteristics of the NFC Reader as well as the various aspects to take into account when integrating the product in a self-service environment.

This document is part of the PCI PTS 5.x approval, and it contains guidelines and instructions that have to be observed by the integrator of the product in order to maintain PCI compliance

Table of Contents

1.1 Revision Log

Date	Rev	Author	Section	Description
2020-01-08	B	MBT	1, 4, 6 & 7	- Added EMV L1 approval number - Moved certification statements to new section and added ISED & FCC statements. - Added explanation for use of the connectors
2019-12-12	A	MSC	All	Document released for external use.
2019-03-12	GA0	MSC	All	Initial version, for internal review.

1.2 Definitions and Abbreviations

Abbreviation	Definition
API	Application Programmers Interface
EMV	Europay, MasterCard and Visa
NFC	Near-Field Communication
PCI	Payment Card Industry
PTS	PIN Transaction Security
SRED	Secure Reading and Exchange of Data
ISED	Innovation, Science and Economic Development Canada
IC	Industry Canada
FCC	Federal Communications Commission
RSS	Radio Standards Specifications

1.3 References

Tag	Reference
[SW]	SV/414-0730 – Generic NFC Reader API Cryptera A/S

2 Introduction

This document describes the Cryptera NFC Reader, which is used as a device in various unattended payment terminals.

Figure 1 – NFC Reader

For specific details on the API, please refer to the documents listed in section 1.3.

It is assumed that the reader has a basic knowledge about unattended payment terminals, as well as general knowledge about handling PCI and FCC approved devices.

2.1 Product Characteristics

The NFC Reader is a contactless acceptance device designed for a broad range of unattended terminals like self-service kiosks, vending machines, petrol dispensers etc.

The robust design is targeted for indoor as well as outdoor environments due to the broad operational temperature range, a high degree of ingress protection and a robust cabinet offering excellent protection against vandalism.

The device supports a variety of international payment scheme kernels, and reads contactless EMV cards, smartphone wallets and apps, as well as wearable payment devices. Please refer to [SW] for further details.

2.2 Product Marking

The product and packaging contains the following labels:

Part	Label Content
Device	The device holds a product label with the following information: **NFC Reader INT3520** Cryptera Part No.: INT3520-20xx Ryy [1)] PCI Approval No.: 4-80048 [2)] FW: 414-xxxx y.z.v [3)] PCD ID: 901-0002 R1A [4)] FCC ID: 2AQ2N-INT3520 IC: 25683-INT3520 Made in Denmark: YYYY-MM [5)] Prod. ID and S/N: xxxx-yyyyyyyy [6)] CE and WEEE symbols Cryptera company address
Clam-shell	The clam-shell holds a copy of the product label (see above) and a separate tamper label.

Table notes:

1) 'xx' indicates variant and 'yy' indicates revision – as in 'INT3520-2020 R1A'.
2) As listed on the PCI website.
3) 'xxxx' indicates application and 'y.z.v' indicates revision – as in '414-0730 P2.1.0'.
4) As listed on the EMVCo website.
5) Production code, where 'YYYY' indicates year and 'MM' indicates month – as in '2018-08'.
6) Barcode and digits, 'xxxx' indicates Product ID and 'yyyyyyyy' indicates the serial number of the device.

2.3 Document Structure

The following Section 0 contains information about the general handling of the device, Section 4 describes the technical characteristics, and Sections 0 and 0 covers the mechanical respectively electrical integration.

The SW API is described in [SW].

3 Handling the Device

The NFC Reader is a PCI PTS approved device, which implies a number of internal security features – triggering any of these will disrupt the normal operation of the device.

To avoid triggering these security features inadvertently, please read and follow the instructions given below.

3.1 Tamper Detection

The NFC Reader is a tamper responsive device, which contains a number of internal sensors. To avoid triggering these, please observe the following:

- Do not open or disassemble the device.
- Do not drop the device on a hard surface.
- Do not subject the device to strong vibrations.
- Do not expose the device to extreme temperatures (below ÷25 °C or above +60 °C), neither in operation nor while transporting or storing.
- Do not remove the internal backup battery.
- Minimize the risk of ESD when handling the device.

3.2 ESD Precautions

During the installation and handling of the device, the operator must at all time use ESD protective measures to prevent an ESD event.

It is recommended to mount the device and ensure proper grounding before connecting the USB cable.

3.3 Cabling

The NFC reader requires a USB connection to the host system.

The device is USB bus powered, so an external power supply is not required.

To assure proper grounding of the device, please connect the GND-connector to the kiosk cabinet using an adequate cable, and make sure that the USB host is also proper grounded to the kiosk cabinet.

3.4 LED Indication

The NFC Reader has operational LED's on the front-side, and diagnostic LED's on the back-side.

The operational LED's – consisting of the white logo LED and four green LED's – indicate the operational state of the device and the transaction progress, which guides cardholder when using the device.

Figure 2 – Operational LED's

The diagnostic LED's indicate the overall state of the device, which will help service technicians when setting the device into operation and/or diagnosing potential problems.

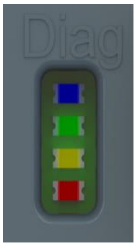

Figure 3 – Diagnostic LED's

3.5 Battery

The NFC Reader contains an internal backup battery, to keep tamper circuits and critical memory areas active also during periods without external power.

The minimum lifetime of the battery is 5 years at normal room temperature +20°C/+68°F and without external power.

3.6 Decommissioning

The NFC Reader may be securely decommissioned by removing the USB cable, opening the device, and removing the backup battery for minimum 5 seconds. This will assure that all sensitive data are gone, and that the device is left unusable.

In order to minimise potential fraud, it is recommended that the decommissioned devices are scrapped and physically damaged, to avoid that the polymer cabinet is used for fraudulent devices.

3.7 Disposal

The NFC Reader contains electronic components and a Li-ion battery, and must be disposed in an appropriate manner after decommissioning.

The device is marked with the EU WEEE symbol, as shown below, to indicate that it shall not be disposed as municipal waste.

Figure 4 – WEEE symbol

4 Technical Specification

4.1 Connections

The NFC Reader supports the following connections:

- USB Device (2.0)
- GND Connector

Figure 5 – Back-side view w/ connectors etc.

Remaining connectors are not supported and shall be left unconnected.

Please refer to section 6.1 for further connector details.

4.2 Switches

The blue Service-switch (marked SVC) located in the lower right corner of Figure 5 has no function.

4.3 Beeper

The NFC Reader contains an internal beeper, which is used to inform cardholders about the result of the NFC reading.

To accommodate with the noise level in the surroundings, the beeper volume is adjustable via the software API. Please refer to [SW] for further details.

4.4 LED's

The NFC Reader contains operational LED's on the front-side, and diagnostic LED's on the back-side.

4.4.1 Operational LED's

The operational LED's guides the cardholder when using the NFC Reader for a contactless transaction. They indicate whether the device is ready for a contactless transaction, and the progress of an on-going contactless transaction.

The LED pattern follows the recommendations from EMVCo.

The intensity of the operational LED's is adjustable via the software API.

For more details, please refer to [SW].

4.4.2 Diagnostic LED's

The diagnostic LED's indicate the overall state of the device.

The following table explains the pattern of the diagnostic LED's.

Device State	**LED's**			
	Red	**Yellow**	**Green**	**Blue**
Initialization / Power-Up				
• Boot-phase	On	On	On | 6 Hz | Off	Off
• SRL	6 Hz | Off	On	On | 6 Hz | Off	Off
• FL	6 Hz | Off	On | 6 Hz	On | 6 Hz | Off	Off
Application				
• No issues detected				
○ No cmd received	Off	1 Hz	1 Hz	
○ First cmd recevied	Off	Off	1 Hz	See note 1
○ Executing cmd		On	On	
• Non-critical issue detected	1 Hz	1 Hz | Off	1 Hz | 6 Hz	
• Critical issue detected	6 Hz	1 Hz	Off	

Legend:

- On – the LED is constantly on
- Off – the LED is constantly off
- x Hz – the LED is blinking with x Hz
- Note 1 – the blue LED is constantly on if the device is in SRED mode

4.5 Environment – Operating and Storage

The following sections define the environmental conditions for the NFC Reader which must be observed during operation, storage and transportation of the device.

4.5.1 Temperature

- Operating
  - Range: ÷25 °C to +60 °C / ÷4 °F to 140 °F
- Storage and Transportation
  - Range: ÷25 °C to +60 °C / ÷4 °F to 140 °F

4.5.2 Humidity

The NFC Reader may be operated, stored and transported in 10-95 % Relative Humidity (non-condensing).

4.5.3 Water Spray

The NFC Reader fulfils IP65 (according to EN60529) from the front-side, when mounted according to the instructions. Please refer to section 5.2 for further details.

The back-side of the reader, incl. the part of the four sides which is 'behind' the gasket when the device is mounted according to the instructions, should not be exposed to water.

4.5.4 Shocks and Blows

The NFC Reader fulfils IK09 (according to EN62262), when mounted according to the instructions. Please refer to section 5.2 for further details.

4.5.5 Installation altitude

The NFC Reader is designed for installation up to 2'000 m above sea level.

4.6 Approvals, Certifications and Compliance

The NFC Reader is approved and certified as stated below.

Note! ***At the time of writing, the NFC Reader is undergoing various approval and certification processes. The current document will be updated with the relevant approval references when available.***

4.6.1 PCI PTS

- PCI PTS 5.x
  - Approval reference: 4-80048
  - Device category: OEM SCR
  - Supported features: CTLS and SRED

4.6.2 EMV

- EMV Contactless Level 1
  - Approval number: 16862 1219 260 26b 26b LGAI

4.6.3 Card Schemes

4.6.3.1 Visa – PayWave

- xxx [TBD – after certification]

4.6.3.2 Mastercard – MCL

- xxx [TBD – after certification]

4.6.3.3 JCB – J/Speedy

- xxx [TBD – after certification]

4.6.3.4 American Express – ExpressPay

- xxx [TBD – after certification]

4.6.3.5 Discover – D-PAS

- xxx [TBD – after certification]

4.6.3.6 Interac – Flash

- xxx [TBD – after certification]

4.6.4 TQM

- xxx [TBD – after certification]

4.6.5 FCC

- FCC ID: 2AQ2N-INT3520

4.6.6 ISED

- IC: 25683-INT3520

5 Mechanical Integration

5.1 Mounting Options

The NFC Reader design allows various mounting options, as it may protrude the front panel, be flush with the front panel, or be mounted internally (hidden behind the front panel). The mounting options are illustrated in the following figure.

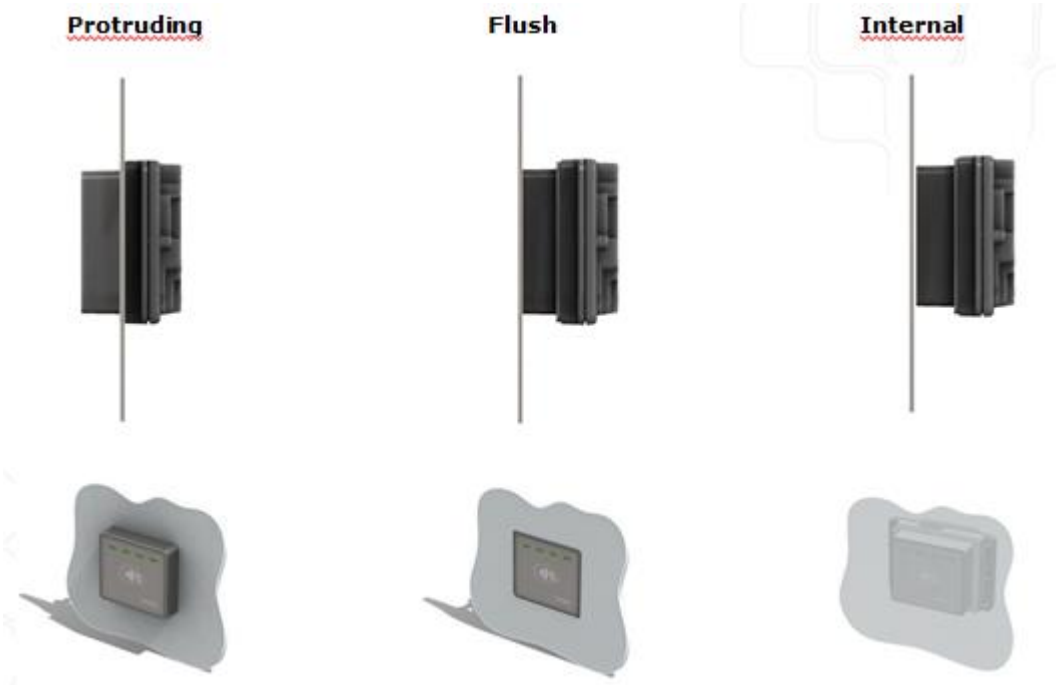

Figure 6 – Mounting options

The NFC Reader may be mounted with full protrusion using the supplied gasket and standard studs or bolts. Other mounting options may require additional mounting brackets etc.

Please note that the recommended mounting is very much depending on the front panel material, as the NFC communication may be impacted by surrounding magnetic material.

The internal NFC Reader antenna plane (2-3 mm from the visible front) should be app. 10 mm from a front panel made of magnetic material, or from magnetic material located immediately behind the front panel, in order to achieve robust NFC communication.

In case the front panel is made of magnetic material, or there's magnetic material immediately behind the front panel, it is recommended to mount the NFC Reader with full protrusion.

In case the front panel is made of non-magnetic material, and there's no magnetic material surrounding the NFC Reader immediately behind the front panel, the NFC reader may be mounted protruding[1], flush with the front panel, or internal in the target equipment.

[1] Partly protruding is also possible, using custom mounting parts.

In any case, it is highly recommended to verify that the specific front panel material and the intended mounting concept allows for a robust NFC communication at an early design stage, before the final design is released for production.

5.2 Mounting Details

5.2.1 Protruding

The recommended mounting for front panels made of magnetic material. The NFC Reader can be mounted with full protrusion using the supplied gasket and standard studs or bolts.

Figure 7 – Protruding

5.2.1.1 Cut-out

The following figure shows the cut-out and mounting details for a full protrusion installation.

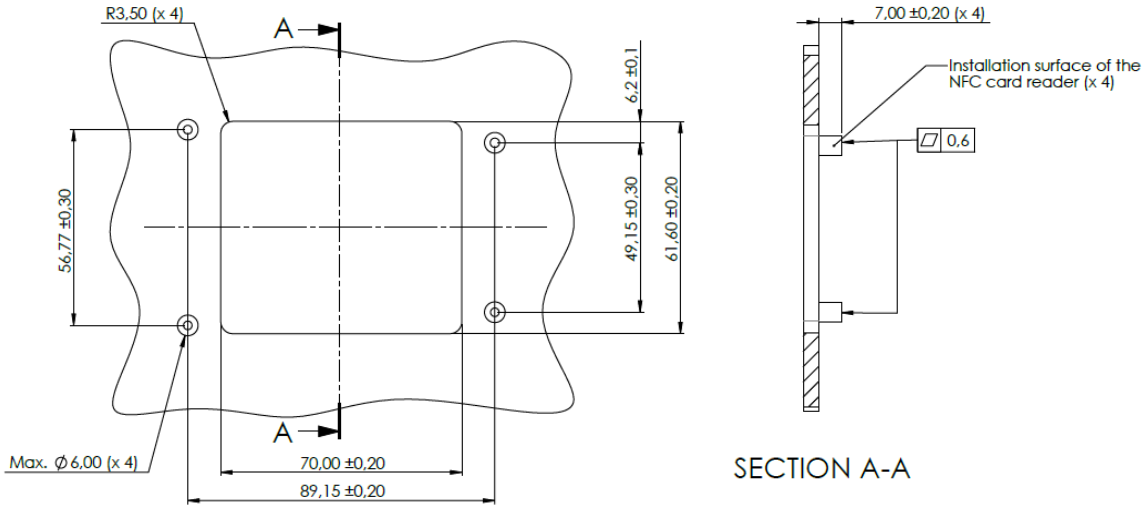

Figure 8 – Cut-out and mounting details

5.2.1.2 Gasket

The supplied gasket must be used, in order to obtain a watertight (IP65) installation and avoid water in the internal parts of the NFC Reader and the target equipment.

5.2.2 Flush

In case the front panel is made of non-magnetic material, the NFC Reader can be mounted flush (or partly protruding). Both variants requires custom mounting parts (e.g. a bracket or similar), to assure a robust installation.

Figure 9 – Flush

5.2.2.1 Cut-out

The cut-out dimensions are determined by the exact mounting position, and should be calculated on a case-by-case basis.

5.2.2.2 Gasket

A dedicated gasket must be used, matching the exact mounting position, to obtain a watertight (IP65) installation and avoid water in the internal parts of the NFC Reader and the target equipment.

5.2.3 Internal

In case the front panel is made of non-magnetic material, the NFC Reader can be mounted internally in the target equipment – right behind the front panel – using custom mounting parts (e.g. a bracket or similar).

Figure 10 – Internal

6 Electrical Integration

6.1 Overview of Connectors

The NFC Reader has two active connectors on the back:

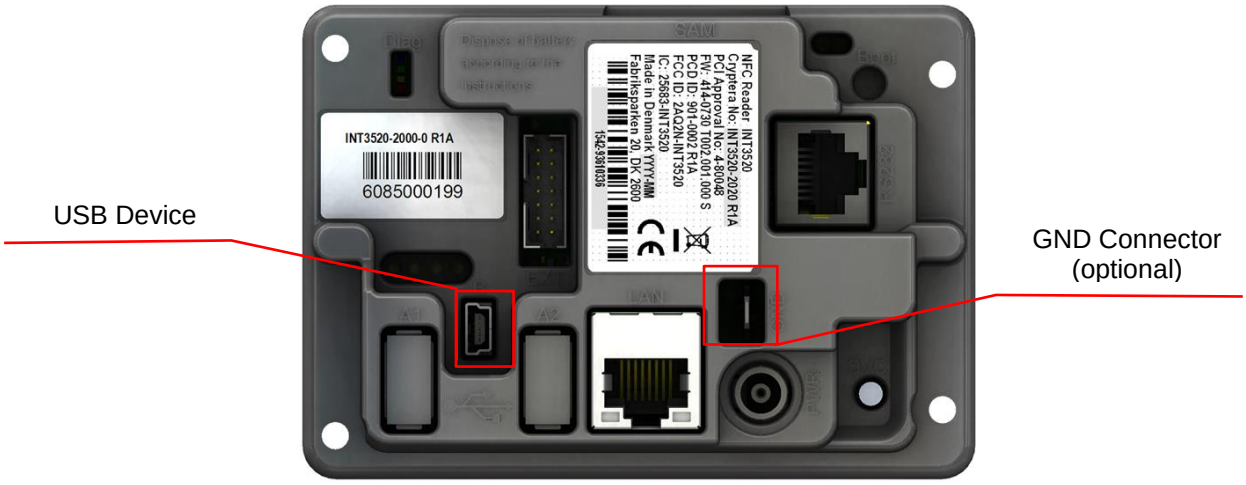

Figure 11 – Back-side view w/ active connectors highlighted

The details related to these connectors are found in the following subsections.

The remaining connectors found on the NFC Reader are not active and must be left as-is, i.e. not connected.

6.2 USB Device Connector

To minimize the voltage drop from the USB Host to the device, it is recommended to use a short and low-ohmic USB cable.

The USB cable must be a USB 2.0 approved cable.

Marking: USB B	**Pin-Out**	
	1	V_{BUS} (5 V)
	2	Data÷
	3	Data+
	4	ID [Not used]
	5	GND
Function	**Connector Type**	**Matching Plug(s)**
USB communication USB bus-power (5 units)	Type-B Mini receptacle	Type-B Mini plug

6.3 GND Connector

If addition ESD protection is needed or to minimize the equipotential between the NFC Reader and an possible metal mounting bezel then this connector can be used.

Marking: GND	**Pin-Out**	
	1	GND
Function	**Connector Type**	**Matching Plug(s)**
GND (protective)	4.75 mm stud	4.75 mm spade connector

7 Certification statement

7.1 FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment generates and uses radio frequency energy, and it may – if not installed and used in accordance with the instructions – cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

Any changes and/or modifications to this device not approved by Cryptera A/S could void the user's authority to operate the device.

7.2 Industry Canada (IC) Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1) L'appareil ne doit pas produire de brouillage;

2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

8 Software Integration

Please refer to [SW].

9 Licensing Information

9.1 Cryptera License

9.2 Third party Notices and Licenses

Required notices for open source or other separately licensed software products or components distributed in the product described in this document are identified in the following table along with the applicable licensing information.

Provider	Component	Licensing information
ARM Limited	mbed TLS	Copyright (C) 2006-2018, Arm Limited (or its affiliates), All Rights Reserved. Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at http://www.apache.org/licenses/LICENSE-2.0. A copy of the License appears below this table: "Apache License"

Apache License

Version 2.0, January 2004
http://www.apache.org/licenses/

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work,

where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

   (a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

   (b) You must cause any modified files to carry prominent notices stating that You changed the files; and

   (c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and

   (d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

   You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise,

unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License");
you may not use this file except in compliance with the License.
You may obtain a copy of the License at

http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License.

<<< End Of Document >>>