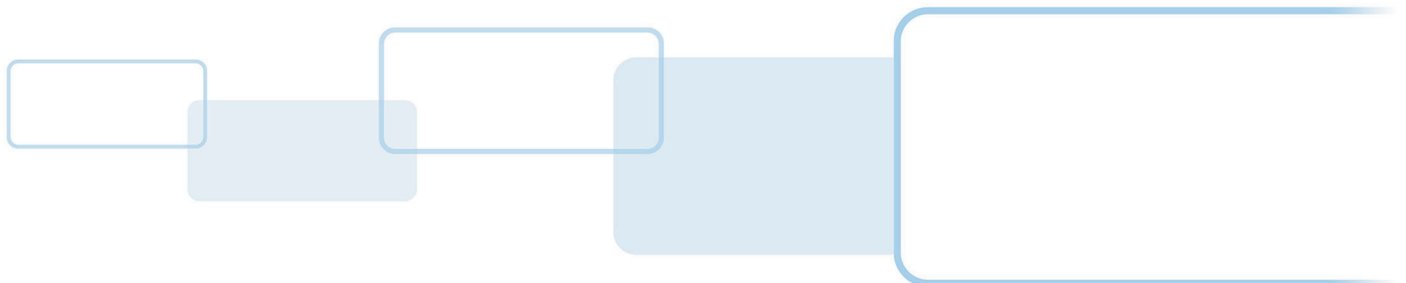


# **5806 & 5906 SERIES SEOS<sup>®</sup> 8K CARDS WITH MIFARE CLASSIC OR DESFIRE EV1 IMPLEMENTATION**

## **APPLICATION NOTE AND ORDER FORM**

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## Revision history

Date	Description	Revision
November 2018	Initial release.	A.0

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# Section 1

## 1 Introduction

The Seos® 5x06 series multi-function cards deliver full Seos 8K functionality, with the addition of MIFARE Classic 4K (5806) or MIFARE DESFire EV1 (5906) implementation.

This application note provides the necessary guidance to ensure successful integration with, or migration from, existing MIFARE Classic 4K or MIFARE DESFire EV1 applications. Test cards are available to order for the purpose of evaluation and qualification. Please contact your local pre-sales representative for guidance.

MIFARE Classic environments and/or devices designed for native implementation are unlikely to support the 58xx series card without modification. It is more likely however, that MIFARE Classic applications designed to operate with multiple ISO14443A layer cards (for example, NXP JCOP or SmartMX® platform) are likely to support the 58xx series card with little or no modification.

The 59xx series card with MIFARE DESFire EV1 implementation is highly likely to operate within DESFire EV1 native environments with little or no modification to the application.

### 1.1 5906 iCLASS SE® reader compatibility

Depending on the model and date of production, a configuration card may be required to enable Seos functionality. If you encounter this issue during testing, please contact your local pre-sales representative.

### 1.2 Part activation process

For the reasons described above, customers are required to demonstrate that they have qualified test cards within the target environment, using the activation form on page 12 or 20. Upon submission of the request form, HID Global will activate requested part numbers; please allow 3-5 working days to process. It is the responsibility of the partner to ensure activated parts are qualified for subsequent projects.

#### New project



#### Future project (using activated part numbers)



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# Section 2

## 2 5806 Seos<sup>®</sup> 8K + MIFARE Classic 4K implementation

### 2.1 Specification

	Seos	MIFARE Classic implementation
<b>Operating frequency</b>	13.56 MHz	13.56 MHz
<b>Communication protocol compliance</b>	ISO14443A-4	ISO14443A-3
<b>SAK</b>	0x38	
<b>ATQA</b>	0x0200	
<b>Communication speed</b>	Up to 848 kbps	106 kbps
<b>Memory type</b>	EEPROM	EEPROM
<b>Memory size</b>	8 Kbytes	4 Kbytes
<b>Multiple applications support</b>	Yes (using Open Data Profile)	Yes
<b>SIO Data Object support</b>	Yes, default	No
<b>HID Data Format support</b>	Yes (wrapped in SIO)	Yes, optional using HID MIFARE application
<b>HID MIFARE application</b>	N/A	Yes, optional (SmartID <sup>®1</sup> and specific iCLASS SE <sup>®</sup> reader models only)
<b>Write endurance / data retention</b>	Min 100,000 cycles / 10 years	Min 100,000 cycles / 10 years
<b>Typical transaction time</b>	Data size dependent	Data size dependent
<b>Extended privacy support</b>	No	No
<b>Security features</b>	Mutual authentication, diversified keys and secure messaging based on AES128	MIFARE Crypto
<b>Security certification</b>	Common Criteria (CC) EAL 5+ HW certified platform	
<b>UID</b>	Global 4 byte static NUID	

1. Discontinued.

	Seos		MIFARE Classic implementation	
	Typical read range			
<b>Reader environment</b>	Standard <sup>1</sup>	On-Metal <sup>2</sup>	Standard <sup>1</sup>	On-Metal <sup>2</sup>
<b>iCLASS SE R10/R15 (including BLE)</b>	1.1-1.6" (3-4 cm)	0.8-1.1" (2-3 cm)	1.1-1.6" (3-4 cm)	0.8-1.1" (2-3 cm)
<b>iCLASS SE R40/RK40 (including BLE)</b>	0.8-2" (2-5 cm)	Use a 1" spacer 0.8-1.6" (2-4 cm)	0.8-2" (2-5 cm)	Use a 1" spacer 0.8-1.6" (2-4 cm)
<b>iCLASS SE RP10/RP15 (including BLE)</b>	0.8-1.1" (2-3 cm)	Use a 0.5" spacer 0.8-1.1" (2-3 cm)	0.8-1.1" (2-3 cm)	Use a 0.5" spacer 0.8-1.1" (2-3 cm)
<b>iCLASS SE RP40/RPK40 (including BLE)</b>	1.1-1.6" (3-4 cm)	Use a 1" spacer 1.1-1.6" (3-4 cm)	1.1-1.6" (3-4 cm)	Use a 1" spacer 1.1-1.6" (3-4 cm)
<b>Dimensions</b>	2.12" x 3.35" x 0.315" (54 mm x 85 mm x 0.8 mm)			
<b>Card construction</b>	Composite with 60% PVC / 40% PET, laminated card			
<b>Weight</b>	About 5.5 g			
<b>Operating temperature</b>	-40°F to +158°F (-40°C to +70°C)			
<b>Storage temperature</b>	-31°F to +122°F (-35°C to +50°C) for 1000 h			
<b>Thermal shock</b>	-31°F to +176°F (-35°C to +80°C), 50 cycles of 5 minutes, 30 s transition time			
<b>Chemical resistance</b>	The card can withstand exposure to salt water (5%), salt mist, acetic acid water (5%), carbonated sodium water (5%), sugared water (10%), fuel B and ethylene glycol (50%) for at least 24 hours			
<b>Card marking</b>	©HID Seos® JMC4 J1P XT			
<b>Printable</b>	Yes (glossy white front /glossy white back) for best results use an HDP printer. Direct-to-card printing not recommended. Contact your HID sales representative or find more information about FARGO® printers on the HID Global website.			
<b>Slot punch</b>	Not available - <u>do not slot punch</u>			
<b>Other options</b>	Custom graphics and magstripe			
<b>Standards compliance</b>	ISO/IEC7810, ISO14443-4 (Seos), ISO14443-3 (MIFARE Classic), ISO10373, ISO60529, ISO7816, RoHS			
<b>Warranty</b>	Lifetime warranty			

1. Based on dry wall mount with no ferrous material within close proximity.
2. Based on metal surface or metal back-box mount.



## 2.2 5806 HID Global product compatibility

Not all HID Global products currently support MIFARE Classic implementation. The following table describes supported products and their functionality:

<b>iCLASS SE readers</b>	<b>Seos support</b>	<b>MIFARE Classic 4K support</b>
iCLASS SE Rev E (R10/R15/R30/R40/RK40)	Read PACS SIO	Read UID
MultiCLASS SE® Rev E (RP10/RP15/RP30/RP40/RPK40)	Read PACS SIO	Read UID
iCLASS SE Rev D (discontinued) (R10/R15/R30/R40/RK40)	Read PACS SIO	Read UID
MultiCLASS SE Rev D (discontinued) (RP10/RP15/RP30/RP40/RPK40)	Read PACS SIO	Read UID
iCLASS® HF Migration Series Rev C (discontinued)	N/A	Read UID Read custom data (requires specific data-mapper configuration).
iCLASS SE Custom Programming Series (Rev E)	Read PACS SIO (may require a configuration update)	Read UID Read custom data (requires specific data-mapper configuration).
SE Bio	Read/write templates	N/A
<b>SmartID readers</b>		
SmartID (discontinued) (HID MIFARE application and custom series)	N/A	Read HID MIFARE Read custom data
<b>Field encoders</b>		
CP1000 SE Encoder	Read/write PACS SIO & custom ADF (use part option "V")	Read/write (HID MIFARE) Read/write (custom)
<b>Embedded reader boards</b>		
SE Reader Module SE3200A00	Read PACS SIO	Read UID Read custom data
SE Reader Module SE3200B00	Read PACS SIO	
OMNIKEY® CK Mini Board (R51270010)	Read PACS SIO & custom data	Read UID Read custom data
OMNIKEY CK Mini Board (R51270001-1)	Read PACS SIO & custom data	Read UID
<b>OMNIKEY desktop readers</b>		
OMNIKEY 5427 MK1 and MK2 Series	Read PACS SIO & custom data	Read UID
OMNIKEY 5022 Series (use MIFARE Preferred mode)	Read PACS SIO & custom data	Read UID Read/write custom data
OMNIKEY 5023 Series (use MIFARE Preferred mode)	Read PACS SIO	Read UID Read/write custom data

## 2.3 iCLASS SE reader ISO14443A-4 UID configuration

The iCLASS SE reader will attempt to prioritize Seos payload over ISO14443A UID read. However, under certain conditions the static UID of the 58xx series card will be read. Disable ISO14443A to avoid invalid card reads. If ISO14443A UID mode is required for other card types, HID recommends using host-controlled reader audio/visual aids to encourage the user to re-present the card in the case of a UID read.

## 2.4 iCLASS HF Migration / iCLASS SE Custom Programming reader configuration

The iCLASS SE HF Migration / iCLASS SE Custom Programming reader series are likely to require a configuration change to support MIFARE Classic implementation. The data map must be configured as an ISO14443A3 object. Use test cards to determine the compatibility of currently installed SE readers. Should you encounter this issue, please contact your local pre-sales representative for assistance.

## 2.5 5806 series MIFARE Classic third-party device compatibility

The 58xx series is an ISO14443A-4 compliant card supporting both Seos and MIFARE Classic 4K implementation at ISO14443A-3. HID Global Seos compatible products, with the exception of HF Migration readers, support Seos functionality transparently without the need for updates to device firmware or changes to configuration. HF Migration readers may require a configuration update.

Third-party MIFARE Classic readers and systems (for example, other brands of physical access control readers or applications such as vending, printing and biometric devices) are likely to require a software update to identify the card as MIFARE Classic compliant. Applications designed to operate with NXP JCOP or Smart MX MIFARE Classic implementation are likely to support the card with little or no modification. This is due to the need to represent a dual ISO14443-4 and ISO14443-3 compliant card via the Select Acknowledge response of the card (SAK), and in some cases devices may halt at the ISO14443A-4 level. Check the specification of the application and/or devices in advance, or use test cards to determine compatibility.

### 2.5.1 SAK coding

A native “standard” MIFARE Classic 4K card has a SAK value of 0x08. In order for Seos to operate alongside MIFARE Classic implementation, the ISO14443-4 flag must be set, resulting in a different overall SAK as shown in the following table. The host application may need modification to recognize and handle the resultant SAK correctly, and switch to ISO14443A-3 layer.

#### Coding of 58xx Series Seos with MIFARE Classic 4K

	MIFARE Classic 1KB SAK = 0x08 (b4 is set)	MIFARE Classic 4KB SAK = 0x18 (b5, b4 are set)	Standard ISO1443-4 (b6 is set)	Resultant SAK
Native MIFARE Classic 4K	-	X	-	0x18
58xx Series	-	X	X (Seos)	0x38

### 2.5.2 ATQA coding

ATQA should not be used to identify the card. However, for reference, it should be noted that the ATQA of the 58xx series card is 0x02. See NXP application note *MIFARE Type Identification Procedure (AN10833)* available from <https://www.NXP.com>.



## 2.6 MIFARE Classic implementation comparison

MIFARE Classic 1K Native	MIFARE Classic 4K Native	58xx series MIFARE Classic 4K Implementation
ATQA: 0x0400	ATQA: 0x0200	ATQA: 0x0200
4-Byte Static NUID (MF1S503yX) 7-Byte/Random UID option available (MF1S500yX)	4-Byte Static NUID (MF1S503yX) 7-Byte/Random ID option available (MF1S500yX)	4-Byte Static NUID or 4 Byte Random UID (7-Byte/Random ID is not supported)
SAK: 0x08	SAK: 0x18	SAK: 0x38
Default A Key: 0xFFFFFFFFFFFF	Default A Key: 0xFFFFFFFFFFFF	Default A Key: 0xFFFFFFFFFFFF
Default B Key: FFFFFFFFFFFFFFFF (set as data and not key)	Default B Key: 0xFFFFFFFFFFFF (set as data and not key)	Default B Key: 0xFFFFFFFFFFFF (set as data and not key)
Access Conditions <b>FF0780</b> 69 (all except last block) <b>FF0780</b> BC (last block 63)	Access Conditions <b>FF0780</b> 69 (all except last block) <b>FF0780</b> BC (last block 135)	Access Conditions <b>FF0780</b> 69 (all except last block) <b>FF0780</b> BC (last block 135)
Sector 0 Requires authentication to read	Sector 0 Requires authentication to read	Sector 0 Requires authentication to read

## 2.7 5806 series test card

Test cards are available to purchase for the purpose of test and qualification. The two part numbers below represent the two core programming profiles. MIFARE Classic is either un-programmed, or programmed with the HID MIFARE application supported by SmartID “HM” model readers.

Part number	Description
5806PNGGANN4-TEST	<ul style="list-style-type: none"> <li>▪ Programmed Seos 8K with matching external #</li> <li>▪ Non-programmed MIFARE Classic 4K implementation</li> <li>▪ 4 byte NUID</li> </ul> Include the desired Seos programming information with your order: format number, facility code and ID range.
5806PMGGAAN4-TEST	<ul style="list-style-type: none"> <li>▪ Programmed Seos 8K with matching external #</li> <li>▪ Programmed HID MIFARE Classic 4K implementation</li> <li>▪ 4 byte NUID</li> </ul> Include the desired Seos and HID MIFARE Classic programming information with your order: format number, facility code and ID range.

## 5806 Seos 8K + MIFARE Classic 4K - Activation Form

Submit this order form to your local HID Global customer service team for processing. HID Global requires all customers to confirm full approval of test part numbers before an order for the final part number is processed.

User the order form to determine the required part numbers.

Upon receipt of this form, HID Global will activate the requested part numbers (please allow 3 working days). As soon as part activation is complete, you may submit your purchase order for processing using the order form.

- I confirm that I have read and understand this application note. Test cards have been issued and fully tested within the target MIFARE Classic and iCLASS SE reader environment. I understand that it is my responsibility to test and qualify all future projects using the below part numbers once activated.

<b>Name</b>	
<b>Title</b>	
<b>Company</b>	
<b>HID Account #</b>	
<b>Date</b>	

Please activate the following part number(s):

<b>Part Number(s)</b>

## 5806 Seos 8K + MIFARE Classic 4K - Order Form

Select a part number from the options below and submit within, or alongside, your completed purchase order. Please activate the requested part number in advance or alongside your purchase order (see *5806 Seos 8K + MIFARE Classic 4K - Activation Form*). Please refer to your HID Global price book for pricing. Programming information is mandatory for all programmed part options (e.g. 5806PN or 5806PM). See *5806 Seos 8K + MIFARE Classic 4K - Advanced Order Form* for additional options.

Select common part number		
<b>5806PNGGANN4</b>	<ul style="list-style-type: none"> <li>■ Programmed (SIO) Seos 8K</li> <li>■ Matching external Seos #</li> <li>■ Non-programmed MIFARE Classic 4K implementation</li> <li>■ 4 byte UID</li> </ul>	Select: <input type="checkbox"/>
<b>5806PNGGBNN4</b>	<ul style="list-style-type: none"> <li>■ Programmed (SIO) Seos 8K</li> <li>■ Non-matching external Seos #</li> <li>■ Non-programmed MIFARE Classic 4K implementation</li> <li>■ 4 byte UID</li> </ul>	Select: <input type="checkbox"/>
<b>5806PNGGN4</b>	<ul style="list-style-type: none"> <li>■ Programmed Seos 8K</li> <li>■ No external Seos # (sales order # only)</li> <li>■ Non-programmed MIFARE Classic 4K implementation</li> <li>■ 4 byte UID</li> </ul>	Select: <input type="checkbox"/>
<b>5806VNGGN4</b>	<ul style="list-style-type: none"> <li>■ Field encoder ready Seos 8K (for CP1000 programmer)</li> <li>■ No matching external Seos #</li> <li>■ Non-programmed MIFARE Classic 4K implementation</li> <li>■ 4 byte UID</li> </ul>	Select: <input type="checkbox"/>
<b>5806PMGGAAN4</b>	<ul style="list-style-type: none"> <li>■ Programmed (SIO) Seos 8K</li> <li>■ Matching external Seos #</li> <li>■ Programmed HID MIFARE Classic 4K implementation</li> <li>■ Matching external MIFARE #</li> <li>■ 4 byte UID</li> </ul>	Select: <input type="checkbox"/>

Seos programming information: required for all 5806PN and 5806PM part numbers					
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #
<b>HID Elite ICE #</b>				<b>Printed start #</b>	<b>Printed stop #</b>

HID MIFARE Classic programming information: required for all 5806PM or 5806VM part numbers					
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #
<b>HID Elite ICE #</b>				<b>Printed start #</b>	<b>Printed stop #</b>

# 5806 Seos 8K + MIFARE Classic 4K - Advanced Order Form

Submit this order form to your local HID Global customer service team for processing. Please ensure you activate part numbers using the part activation form, otherwise the order cannot be processed. Please allow extra time for activation of advanced part options.

<b>Seos Memory Size</b>		
<input checked="" type="checkbox"/>	6 - 8 Kbytes	
<b>Seos Programming (select one option)</b>		
<input type="checkbox"/>	P - Programmed with Security Identity Object (SIO): <i>Provide full programming information.</i>	
<input type="checkbox"/>	V - Encoder Ready, for use with iCLASS SE Encoder	
<b>MIFARE Classic 4K Programming (select one option)</b>		
<input type="checkbox"/>	N - Non-programmed with native MIFARE Classic access conditions	
<input type="checkbox"/>	M - HID MIFARE Classic application (compatible with SmartID HID MIFARE enabled readers). <i>Provide full programming information.</i>	
<input type="checkbox"/>	S - Custom programmed MIFARE Classic. This option requires a custom part number with suffix to be set up - contact pre-sales.	
<b>Front Packaging (select one option)</b>		
<input type="checkbox"/>	G - Plain White with Gloss Finish	
<input type="checkbox"/>	C - Custom Artwork with Gloss Finish. <i>Specify custom artwork number.</i>	
<b>Back Packaging (select one option)</b>		
<input type="checkbox"/>	G - Plain White with Gloss Finish	
<input type="checkbox"/>	C - Custom Artwork with Gloss Finish. <i>Specify custom artwork number.</i>	
<input type="checkbox"/>	1 - Plain White with Gloss Finish with 4000 Oe Magnetic Stripe	
<input type="checkbox"/>	3 - Custom Artwork with Gloss Finish with Magnetic Stripe. <i>Specify custom artwork number.</i>	
<b>Seos Card Numbering (select one option)</b>		
<input type="checkbox"/>	N - No Printed Card Numbering. The card will be marked with Sales Order Number and relevant programming identification markings.	
<input type="checkbox"/>	A - Sequential Matching Encoded/Printed (Laser Engraved)	
<input type="checkbox"/>	B - Sequential Encoded/Sequential Non-Matching Printed (Laser Engraved)	
<input type="checkbox"/>	C - Random Encoded/Non-Matching Sequential Printed (Laser Engraved)	
<b>MIFARE Classic Card Numbering (select one option)</b>		
<input type="checkbox"/>	N - No Printed Card Numbering. The card will be marked with Sales Order Number and relevant programming identification markings.	
<input type="checkbox"/>	A - Sequential Matching Encoded/Printed (Laser Engraved)	
<input type="checkbox"/>	B - Sequential Encoded/Sequential Non-Matching Printed (Laser Engraved)	
<input type="checkbox"/>	C - Random Encoded/Non-Matching Sequential Printed (Laser Engraved)	
<b>Slot Punch (select one option)</b>		
<input checked="" type="checkbox"/>	N - No slot punch. <u>Do not slot punch this card.</u>	
<b>UID</b>		
<input checked="" type="checkbox"/>	4 Byte Static Non-Unique UID (NUID)	

<b>Enter Required Part Option</b>											
<b>Part Number</b>	<b>5806</b>							<b>N</b>	<b>4</b>	-	_____ (Options #)

<b>Seos Programming Information: required for all 5806Px part numbers</b>					
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #
<b>HID Elite ICE #</b>				<b>Printed start #</b>	<b>Printed stop #</b>

<b>HID MIFARE Classic Programming Information: required for all 5806xM or 5806xS part numbers</b>					
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #
<b>HID Elite ICE #</b>				<b>Printed start #</b>	<b>Printed stop #</b>

# Section 3

## 3 5906 Seos® 8K + MIFARE DESFire EV1 8K implementation

### 3.1 Specification

	Seos	MIFARE DESFire EV1 implementation
<b>Operating frequency</b>	13.56 MHz	13.56 MHz
<b>Communication protocol compliance</b>	ISO14443A-4	ISO14443A-4
<b>SAK</b>	0x20	
<b>ATQA</b>	0x4403	
<b>Communication speed</b>	Up to 848 kbps	Up to 848 kbps
<b>Memory type</b>	EEPROM	EEPROM
<b>Memory size</b>	8 Kbytes	8 Kbytes
<b>Multiple applications support</b>	Yes (using Open Data Profile)	Yes
<b>SIO Data Object support</b>	Yes, default	No
<b>HID Data Format support</b>	Yes (wrapped in SIO)	No
<b>Write endurance / data retention</b>	Min 100,000 cycles / 10 years	Min 100,000 cycles / 10 years
<b>Typical transaction time</b>	Data size dependent	Data size dependent
<b>Extended privacy support</b>	No	No
<b>Security features</b>	Mutual authentication compliant to ISO/IEC 24727-3:2008, using NIST SP800-108 key diversification based on AES128. Secure messaging compliant to EN 14890-1:2009 and session key derivation based on NIST SP 800-56A.	3-pass mutual authentication based on 3DES or AES128, CRC16 and 4-byte MAC (TDES) or CRC32 and 8-byte CMAC (TDES or AES128)
<b>Security certification</b>	Common Criteria (CC) EAL 5+ HW certified platform	
<b>UID</b>	Global 7 byte static NUID (random 4 byte UID option available via special request)	

	Seos		MIFARE DESFire EV1 implementation	
	Typical read range			
<b>Reader environment</b>	Standard <sup>1</sup>	On-Metal <sup>2</sup>	Standard <sup>1</sup>	On-Metal <sup>2</sup>
<b>iCLASS SE® R10/R15 (including BLE)</b>	1.1-1.6" (3-4 cm)	0.8-1.1" (2-3 cm)	1.1-1.6" (3-4 cm)	0.8-1.1" (2-3 cm)
<b>iCLASS SE R40/RK40 (including BLE)</b>	0.8-2" (2-5 cm)	Use a 1" spacer 0.8-1.6" (2-4 cm)	0.8-2" (2-5 cm)	Use a 1" spacer 0.8-1.6" (2-4 cm)
<b>iCLASS SE RP10/RP15 (including BLE)</b>	0.8-1.1" (2-3 cm)	Use a 0.5" spacer 0.8-1.1" (2-3 cm)	0.8-1.1" (2-3 cm)	Use a 0.5" spacer 0.8-1.1" (2-3 cm)
<b>iCLASS SE RP40/RPK40 (including BLE)</b>	1.1-1.6" (3-4 cm)	Use a 1" spacer 1.1-1.6" (3-4 cm)	1.1-1.6" (3-4 cm)	Use a 1" spacer 1.1-1.6" (3-4 cm)
<b>Dimensions</b>	2.12" x 3.35" x 0.315" (54 mm x 85 mm x 0.8 mm)			
<b>Card construction</b>	Composite with 60% PVC / 40% PET, laminated card			
<b>Weight</b>	About 5.5 g			
<b>Operating temperature</b>	-40°F to +158°F (-40°C to +70°C)			
<b>Storage temperature</b>	-31°F to +122°F (-35°C to +50°C) for 1000 h			
<b>Thermal shock</b>	-31°F to +176°F (-35°C to +80°C), 50 cycles of 5 minutes, 30 s transition time			
<b>Chemical resistance</b>	The card can withstand exposure to salt water (5%), salt mist, acetic acid water (5%), carbonated sodium water (5%), sugared water (10%), fuel B and ethylene glycol (50%) for at least 24 hours			
<b>Card marking</b>	©HID Seos® JMD8 J2P XT			
<b>Printable</b>	Yes (glossy white front /glossy white back) for best results use an HDP printer. Direct-to-card printing not recommended. Contact your HID sales representative or find more information about FARGO® printers on the HID Global website.			
<b>Slot punch</b>	Not available - <u>do not slot punch</u>			
<b>Other options</b>	Custom graphics and magstripe			
<b>Standards compliance</b>	ISO/IEC7810, ISO14443-4 (Seos), ISO14443-3 (MIFARE Classic), ISO10373, ISO60529, ISO7816, RoHS			
<b>Warranty</b>	Lifetime warranty			

1. Based on dry wall mount with no ferrous material within close proximity.
2. Based on metal surface or metal back-box mount.



## 3.2 5906 HID Global product compatibility

Not all HID Global products currently support MIFARE DESFire EV1 implementation. The following table describes supported products and their functionality:

<b>iCLASS SE readers</b>	<b>Seos support</b>	<b>DESFire EV1 support</b>
iCLASS SE Rev E (R10/R15/R30/R40/RK40)	Read PACS SIO (a configuration card may be required)	Read UID
MultiCLASS SE® Rev E (RP10/RP15/RP30/RP40/RPK40)	Read PACS SIO (a configuration card may be required)	Read UID
iCLASS SE Rev D (discontinued) (R10/R15/R30/R40/RK40)	Read PACS SIO (a configuration card may be required)	Read UID
MultiCLASS SE Rev D (discontinued) (RP10/RP15/RP30/RP40/RPK40)	Read PACS SIO (a configuration card may be required)	Read UID
iCLASS® HF Migration Series Rev C (discontinued)	N/A	Read UID Read custom data
iCLASS SE Custom Programming Series (Rev E)	Read PACS SIO (a configuration card will be required)	Read UID Read custom data
<b>Field encoders</b>		
CP1000 SE Encoder	Read/write PACS SIO (use part option "V")	Read/write custom data
<b>Embedded reader boards</b>		
SE Reader Module SE3200A00	Read PACS SIO	Read UID
SE Reader Module SE3200BP0	Read PACS SIO	Read UID Read custom data
OMNIKEY® CK Mini Board (R51270010)	Read PACS SIO & custom data	Read UID Read custom data
OMNIKEY CK Mini Board (R51270001-1)	Read PACS SIO & custom data	Read UID Read custom data
<b>OMNIKEY desktop readers</b>		
OMNIKEY 5427 MK1 Series	Read PACS SIO & custom data	Read UID
OMNIKEY 5022 Series	Read PACS SIO & custom data	Read UID
OMNIKEY 5023 Series	Read PACS SIO	Read UID

## 3.3 iCLASS SE reader 5906 Seos configuration

iCLASS SE readers produced before May 2016 and iCLASS SE Custom Programming reader configurations may not support the Seos 5906 series (Seos read) without a configuration update. Use test cards to determine the compatibility of the current iCLASS SE reader installation. Should you encounter this issue, please contact your local pre-sales representative for assistance.

### 3.4 iCLASS SE reader ISO14443A-4 UID configuration

The iCLASS SE reader will attempt to prioritize Seos payload over ISO14443A UID read. However, under certain conditions the static UID of the 59xx series card will be read. Disable ISO14443A to avoid invalid card reads. If ISO14443A UID mode is required for other card types, HID recommends using host-controlled reader audio/visual aids to encourage the user to re-present the card in the case of a UID read.

### 3.5 5906 MIFARE DESFire EV1 third-party device compatibility

Third-party native MIFARE DESFire EV1 devices and systems (for example, other brands of physical access control readers or applications such as vending, printing and biometric devices) are likely to support the MIFARE DESFire EV1 implementation with little or no update. Use test cards to determine compatibility of the existing installation base.

#### 3.5.1 SAK coding

The 59xx series Seos with MIFARE DESfire EV1 uses the same SAK value as a native “standard” MIFARE DESFire card (0x20).

##### Coding of 59xx Series Seos with MIFARE DESFire EV1

	MIFARE Classic 1KB SAK = 0x08 (b4 is set)	MIFARE Classic 4KB SAK = 0x18 (b5, b4 are set)	MIFARE DESFire / ISO14443-4 SAK = 0x20 (b6 is set)	Resultant SAK
59xx Series	-	-	X	0x20

#### 3.5.2 ATQA coding

Do not use the ATQA alone to identify the card. The ATQA of the 59xx series card is 0x4403. See NXP application note *MIFARE Type Identification Procedure* (AN10833) available from <https://www.nxp.com>.

### 3.6 5906 MIFARE DESFire EV1 implementation comparison

MIFARE DESFire EV1 Native	59xx Series MIFARE DESFire EV1 Implementation
ATQA: 0x4403	ATQA: 0x4403
7-Byte UID Switch to Random UID supported.	7-Byte UID Switch to Random UID not supported.
SAK: 0x20	SAK: 0x20
ATS:0x067577810280	ATS: 0x0578F7A102
Set User Defined ATS = YES	Set User Defined ATS = NO
Command variations	
Get Version (native) 0x (AF)04010101001A05 (AF)04010101041A05 0000000000000000B90C1651404416 HW Info: Vendor=0x04; Type=0x0101; Ver=0x0100; Storage=0x1A; Comm=0x05 SW Info: Vendor=0x04; Type=0x0101; Ver: 0x0104; Storage: 0x1A; Comm=0x05	Get Version (native) 0x (AF)04810101001A05 (AF)04810101011A05 0000000000000000BA551093704014 HW Info: Vendor=0x04; Type=0x8101; Ver=0x0100; Storage=0x1A; Comm=0x05 SW Info: Vendor=0x04; Type=0x8101; Ver=0x0101; Storage=0x1A; Comm=0x05
Get Version (wrap) 0x 04010101001A05 91(AF) 04010101041A05 91(AF) 0000000000000000B90C1651404416 9100	Get Version (wrap) 0x 04810101001A05 91(AF) 04810101011A05 91(AF) 0000000000000000BA551093704014 9100
Select DF ID "0001" (ISO) 0x9000	Select DF ID "0001" (ISO) 0x6A82
Select DF Name >= 5Bytes "0102030405" (ISO) 0x9000	Select DF Name >= 5Bytes "0102030405" (ISO) 0x6A82
Select DF Name >= 5Bytes "012203440566" (ISO) 0x9000	Select DF Name >= 5Bytes "012203440566" (ISO) 0x6A82
Select DF Name >= 5Bytes "11223344556677" (ISO) 0x9000	Select DF Name >= 5Bytes "11223344556677" (ISO) 0x6A82

### 3.7 5906 test card

Test cards are available to purchase for the purpose of test and qualification. The part number below represents the core programming profile (Seos programmed, MIFARE DESFire EV1 un-programmed).

Part number	Description
5906PNGGANN7-TEST	<ul style="list-style-type: none"> <li>■ Programmed Seos 8K with matching external #</li> <li>■ Non-programmed MIFARE DESFire EV1 implementation</li> <li>■ 7 byte NUID</li> </ul> <p>Include the desired Seos programming information with your order: format number, facility code and ID range.</p>

## 5906 Seos + MIFARE DESFire EV1 - Activation Form

Submit this order form to your local HID Global customer service team for processing. HID Global requires all customers to confirm full approval of test part numbers before an order for the final part number is processed.

User the order form to determine the required part numbers.

Upon receipt of this form, HID Global will activate the requested part numbers (please allow 3 working days). As soon as part activation is complete, you may submit your purchase order for processing using the order form.

- I confirm that I have read and understand this application note. Test cards have been issued and fully tested within the target MIFARE DESFire EV1 and iCLASS SE reader environment. I understand that it is my responsibility to test and qualify all future projects using the below part numbers once activated.

<b>Name</b>	
<b>Title</b>	
<b>Company</b>	
<b>HID Account #</b>	
<b>Date</b>	

Please activate the following part number(s):

<b>Part Number(s)</b>

## 5906 Seos 8K + MIFARE DESFire EV1 8K - Order Form

Determine the required part number from the options below and submit within, or alongside, your completed purchase order. Please refer to your HID Global price book for pricing. Please activate the requested part number in advance (see *5906 Seos + MIFARE DESFire EV1 - Activation Form*). Programming information is mandatory for all programmed part options (e.g. 5906PN). See *5906 Seos 8K + MIFARE DESFire EV1 8K - Advanced Order Form* for additional options.

Select common part number		
<b>5906PNGGANN7</b>	<ul style="list-style-type: none"> <li>■ Programmed (SIO) Seos 8K</li> <li>■ Matching external Seos #</li> <li>■ Non-programmed MIFARE DESFire EV1 8K implementation</li> <li>■ 7 byte UID</li> </ul>	Select: <input type="checkbox"/>
<b>5906PNGGBNN7</b>	<ul style="list-style-type: none"> <li>■ Programmed (SIO) Seos 8K</li> <li>■ Non-matching external Seos #</li> <li>■ Non-programmed MIFARE DESFire EV1 8K implementation</li> <li>■ 7 byte UID</li> </ul>	Select: <input type="checkbox"/>
<b>5906PNGGNNN7</b>	<ul style="list-style-type: none"> <li>■ Programmed Seos 8K</li> <li>■ No external Seos # (sales order # only)</li> <li>■ Non-programmed MIFARE DESFire EV1 8K implementation</li> <li>■ 7 byte UID</li> </ul>	Select: <input type="checkbox"/>
<b>5906VNGGNNN7</b>	<ul style="list-style-type: none"> <li>■ Field encoder ready Seos 8K (for CP1000 programmer)</li> <li>■ No external Seos #</li> <li>■ Non-programmed MIFARE DESFire EV1 8K implementation</li> <li>■ 7 byte UID</li> </ul>	Select: <input type="checkbox"/>

Seos programming information: required for all 5906PN part numbers					
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #
<b>HID Elite ICE #</b>				<b>Printed start #</b>	<b>Printed stop #</b>

# 5906 Seos 8K + MIFARE DESFire EV1 8K - Advanced Order Form

Submit this order form to your local HID Global customer service team for processing. Please ensure you activate part numbers using the part activation form, otherwise the order cannot be processed.

<b>Seos Memory Size</b>		
<input checked="" type="checkbox"/>	6 - 8 Kbytes	
<b>Seos Programming (select one option)</b>		
<input type="checkbox"/>	P - Programmed with Security Identity Object (SIO)	
<input type="checkbox"/>	V - Encoder Ready, for use with iCLASS SE Encoder	
<b>MIFARE DESFire EV1 8K Programming (select one option)</b>		
<input type="checkbox"/>	N - Non-programmed	
<input type="checkbox"/>	S - Custom programmed. This option requires a custom part number with suffix to be set up - contact pre-sales.	
<b>Front Packaging (select one option)</b>		
<input type="checkbox"/>	G - Plain White with Gloss Finish	
<input type="checkbox"/>	C - Custom Artwork with Gloss Finish. <i>Specify custom artwork number.</i>	
<b>Back Packaging (select one option)</b>		
<input type="checkbox"/>	G - Plain White with Gloss Finish	
<input type="checkbox"/>	C - Custom Artwork with Gloss Finish. <i>Specify custom artwork number.</i>	
<input type="checkbox"/>	1 - Plain White with Gloss Finish with Magnetic Stripe	
<input type="checkbox"/>	3 - Custom Artwork with Gloss Finish with Magnetic Stripe. <i>Specify custom artwork number.</i>	
<b>Seos Card Numbering (select one option)</b>		
<input type="checkbox"/>	N - No Printed Card Numbering. The card will be marked with Sales Order Number and relevant programming identification markings.	
<input type="checkbox"/>	A - Sequential Matching Encoded/Printed (Laser Engraved)	
<input type="checkbox"/>	B - Sequential Encoded/Sequential Non-Matching Printed (Laser Engraved)	
<input type="checkbox"/>	C - Random Encoded/Non-Matching Sequential Printed (Laser Engraved)	
<b>MIFARE DESFire Card Numbering (select one option)</b>		
<input type="checkbox"/>	N - No Printed Card Numbering. The card will be marked with Sales Order Number and relevant programming identification markings.	
<input type="checkbox"/>	A - Sequential Matching Encoded/Printed (Laser Engraved)	
<input type="checkbox"/>	B - Sequential Encoded/Sequential Non-Matching Printed (Laser Engraved)	
<input type="checkbox"/>	C - Random Encoded/Non-Matching Sequential Printed (Laser Engraved)	
<b>Slot Punch (select one option)</b>		
<input checked="" type="checkbox"/>	N - No slot punch. Do not slot punch this card.	
<b>UID</b>		
<input checked="" type="checkbox"/>	7 Byte Non-Unique UID (NUID)	
<b>Option - Custom Artwork</b>		
<input type="checkbox"/>	Specify Artwork Number. Refer to the Custom Artwork Forms for new artwork.	

<b>Enter Required Part Option</b>											
<b>Part Number</b>	5906							N	7	-	_____ (Options #)

Seos Programming Information: required for all 5906Px part numbers					
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #
HID Elite ICE #				Printed start #	Printed stop #

MIFARE DESFire EV1 8K Programming Information (custom part numbers only)					
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #
HID Elite ICE #				Printed start #	Printed stop #

# Appendix A

## A How to complete programming information

Programming information is mandatory if you select a programmed option. There are only two programming options that will require a format and programming information:

- Seos® Programmed option (5806 and 5906) series
- HID MIFARE Classic Programming option (5806 series), compatible with SmartID® “HM” option readers.

**Note:** If custom MIFARE Classic or MIFARE DESFire EV1 programming is required, contact your local pre-sales representative for assistance; a custom part number will be required.

### A.1 Example 1: 5806PMGGAAN4 (100 cards)

<b>Part Number</b>	<b>5806</b>	<b>P</b>	<b>M</b>	<b>G</b>	<b>G</b>	<b>A</b>	<b>A</b>	<b>N</b>	<b>4</b>	-	_____ (Options #)
--------------------	-------------	----------	----------	----------	----------	----------	----------	----------	----------	---	-------------------

Seos Programming Information (required for all 5806Px part numbers)						
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #	
<b>H10301</b>	<b>Facility Code</b>	<b>99</b>	<b>100</b>	<b>101</b>	<b>200</b>	
<b>HID Elite ICE #</b>				<b>Printed start #</b>	<b>Printed stop #</b>	
<b>N/A</b>				<b>101</b>	<b>200</b>	

MIFARE Classic Programming Information (required for all 5806xM part numbers)						
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #	
<b>H10301</b>	<b>Facility Code</b>	<b>105</b>	<b>100</b>	<b>501</b>	<b>600</b>	
<b>HID Elite ICE #</b>				<b>Printed start #</b>	<b>Printed stop #</b>	
				<b>501</b>	<b>600</b>	

## A.2 Example 2: 5906PNGGANN7 (500 cards)

Part Number	<b>5906</b>	<b>P</b>	<b>N</b>	<b>G</b>	<b>G</b>	<b>A</b>	<b>N</b>	<b>N</b>	<b>7</b>	-	_____ (Options #)
-------------	-------------	----------	----------	----------	----------	----------	----------	----------	----------	---	-------------------

Seos Programming Information (required for all 5906Px part numbers)						
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #	
<b>H10301</b>	<b>Facility Code</b>	<b>99</b>	<b>500</b>	<b>101</b>	<b>600</b>	
HID Elite ICE #				Printed start #	Printed stop #	
N/A				<b>101</b>	<b>600</b>	

MIFARE DESFire EV1 Programming Information (custom part numbers only)						
Format #	Field name(s) e.g. facility code	Value	Qty	Encoded start #	Encoded stop #	
HID Elite ICE #				Printed start #	Printed stop #	



# Appendix B

## B UID specification

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### 7 Byte UID

Standard: ISO14443A

Length: 7 bytes (56-bits) cascade level 2 (59xx series)

Cascade Level 1

CT	UID0	UID1	UID2	BCC
----	------	------	------	-----

Cascade Level 2

UID3	UID4	UID5	UID6	BCC
------	------	------	------	-----

BCC = Block Check Character

CT = Cascade Tag

UID0-UID6 = 7 byte UID

The target system should support the full 56-bit UID value. A truncated UID will result in duplicate values. It is important to note that ISO14443A UID reader devices may reverse the bit or byte order of the UID resulting in a different ID if used with different readers or systems.

Example 7 Byte UID:

Hex: 0x3D4C0112146578

Decimal: 17253541061354872

### 4 Byte NUID

Standard: ISO14443A

Length: 4 bytes (32-bits) cascade level 1 (58xx series)

Cascade Level 1

UID0	UID1	UID2	UID3	BCC
------	------	------	------	-----

BCC = Block Check Character

UID0-UID3 = 4 byte UID

The target system should support the full 56-bit UID value. A truncated UID will result in duplicate values. It is important to note that ISO14443A UID reader devices may reverse the bit or byte order of the UID resulting in a different ID if used with different readers or systems.

Example 7 Byte UID:

Hex: 0xC0BFADC9

Decimal: 3233787337

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# Appendix **C**

## **C Product lead times**

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Production lead time (where stock is available) is as follows:

- < 1,000 units: 3-5 days + shipping time
- > 1,000 units: Lead time determined at time of order

All magstripe and custom graphics orders are processed on a make-to-order basis and will incur a longer lead time.

If stock is not available and depending on order quantity, please allow for an 8-18 week delivery period during the first six months post launch. We anticipate a reduction in general lead times thereafter.

Please contact your local sales representative to discuss quantities greater than 5,000 units in advance to help reduce overall lead time.

