kDynamo

Secure Card Multimedia Device for iPad
Installation and Operation Manual

Table 0-1 - Revisions

Rev Number	Date	Notes
10	Nov 5, 2018	Initial Release
11	Nov 8, 2019	Change to reflect there are now two available models for iPad mini with adapter shells included, add iPad mini 5 (**About Solution Planning**, **Table 1-1**, **Figure 2-2**, **Appendix A**)

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FCC INFORMATION

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.

Note: 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.

Caution: Changes or modifications not expressly approved by MagTek could void the user's authority to operate this equipment.

CE STANDARDS

Testing for compliance with CE requirements was performed by an independent laboratory. The unit under test was found compliant with standards established for Class B devices.

UL/CSA

This product is recognized per *UL 60950-1, 2nd Edition, 2011-12-19* (Information Technology Equipment - Safety - Part 1: General Requirements), *CSA C22.2 No. 60950-1-07, 2nd Edition, 2011-12* (Information Technology Equipment - Safety - Part 1: General Requirements).

ROHS STATEMENT

When ordered as RoHS compliant, this product meets the Electrical and Electronic Equipment (EEE) Reduction of Hazardous Substances (RoHS) European Directive 2002/95/EC. The marking is clearly recognizable, either as written words like "Pb-free," "lead-free," or as another clear symbol (Ⓟ).

Table of Contents

1 Introduction

1.1 About kDynamo

kDynamo makes mobile payments and card reading easier than ever and adds EMV contactless/NFC and contact EMV chip card reading capabilities while maintaining its small footprint. It works with iPad (4th, 5th, and 6th generation), iPad Pro 9.7-inch, iPad Air, iPad Air 2, iPad mini (2, 3, 4, and 5).

kDynamo product features include:

- Secure card reader authenticator
- Bidirectional, 3 track magnetic stripe card reader ANSI/ISO/AAMVA ISO 7810/7811
- EMV L2 contact chip card reader
- EMV contactless / NFC (most mobile payment applications)
- Rechargeable battery
- Connects through Lightning connector
- Made for iPad (4th, 5th, and 6th generation), iPad Pro 9.7-inch, iPad Air, iPad Air 2, iPad mini (2, 3, 4, and 5)
- Triple DES encryption and DUKPT key management
- Magensa keys come standard, custom keys are available
- Dynamic encryption, tokenization, and authentication
- MagneSafe Security Architecture
- MagnePrint® card authentication
- Device/host authentication
- Unique, non-changeable serial number
- Time bound session IDs

1.2 Rugged and Reliable

kDynamo is rugged, affordable, and designed to perform to the high standards set by MagTek, the world's most prolific supplier of secure payment technology for over 40 years. The swipe path is optimized for a more reliable and stable one-swipe read; the chip card insertion card slot is easy to access; and the contactless/NFC antenna is positioned to make contactless reading simple and reliable.

1.3 Follows Your Lead

kDynamo mini keeps you on the go with its smaller size and handheld ease-of-use. kDynamo Air features a 100mm VESA (Video Electronics Standards Association) standard mounting pattern that provides fixed mounting for greater security and convenience, allowing users to deploy kDynamo Air in a variety of off the shelf semi-mobile or permanent mounts, and eliminating the need for expensive customization.

Software on the connected iPad host controls kDynamo's operation via control, status, and data functions available through the Lightning interface. MagTek understands the value of easy-to-use, well-documented APIs, Software Development Kits (SDKs), and sample code, which speed development and integration and reduce time to market. MagTek SDKs have no royalties or maintenance fees and are free to redistribute with your application. For even easier development, use MagTek's MagneFlex browser or middleware application.

1.4   MagneSafe Security Architecture

kDynamo uses the MagneSafe Security Architecture (MSA) combined with the power of iOS tablets. The MSA delivers open standards encryption with simple, yet proven derived unique key per transaction (DUKPT) key management and MagnePrint card authentication to maximize data protection and prevent the use of counterfeit cards. Mobile merchants can leverage the power of their iOS tablets without the worries of handling or storing sensitive card data at any time. Ideal for any size merchant, this powerful combination assures convenience and cost savings while ensuring transaction security from the moment the card is swiped all the way to authorization.

kDynamo encrypts the data inside the reader and offers additional security layers with MagnePrint card authentication. This layered approach to security far exceeds the protection of encryption by itself, decreases the scope of PCI compliance, and reduces fraud.

1.5   About kDynamo Components

The major components of kDynamo mini are shown in **Figure 1-1** below. The major components of kDynamo Air are shown in **Figure 1-2** below.
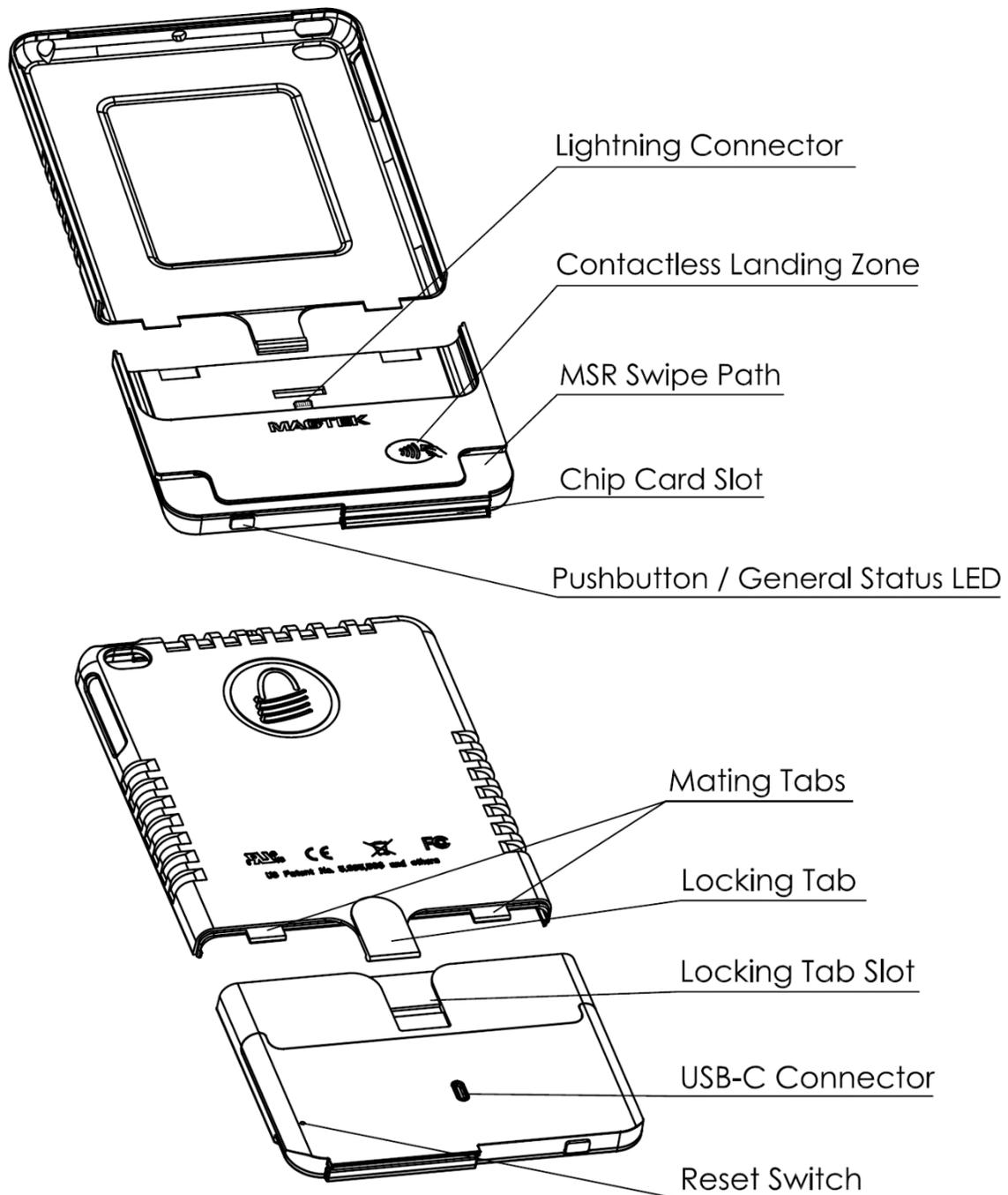
Figure 1-1 - kDynamo mini Major Components (21097102 Shown)
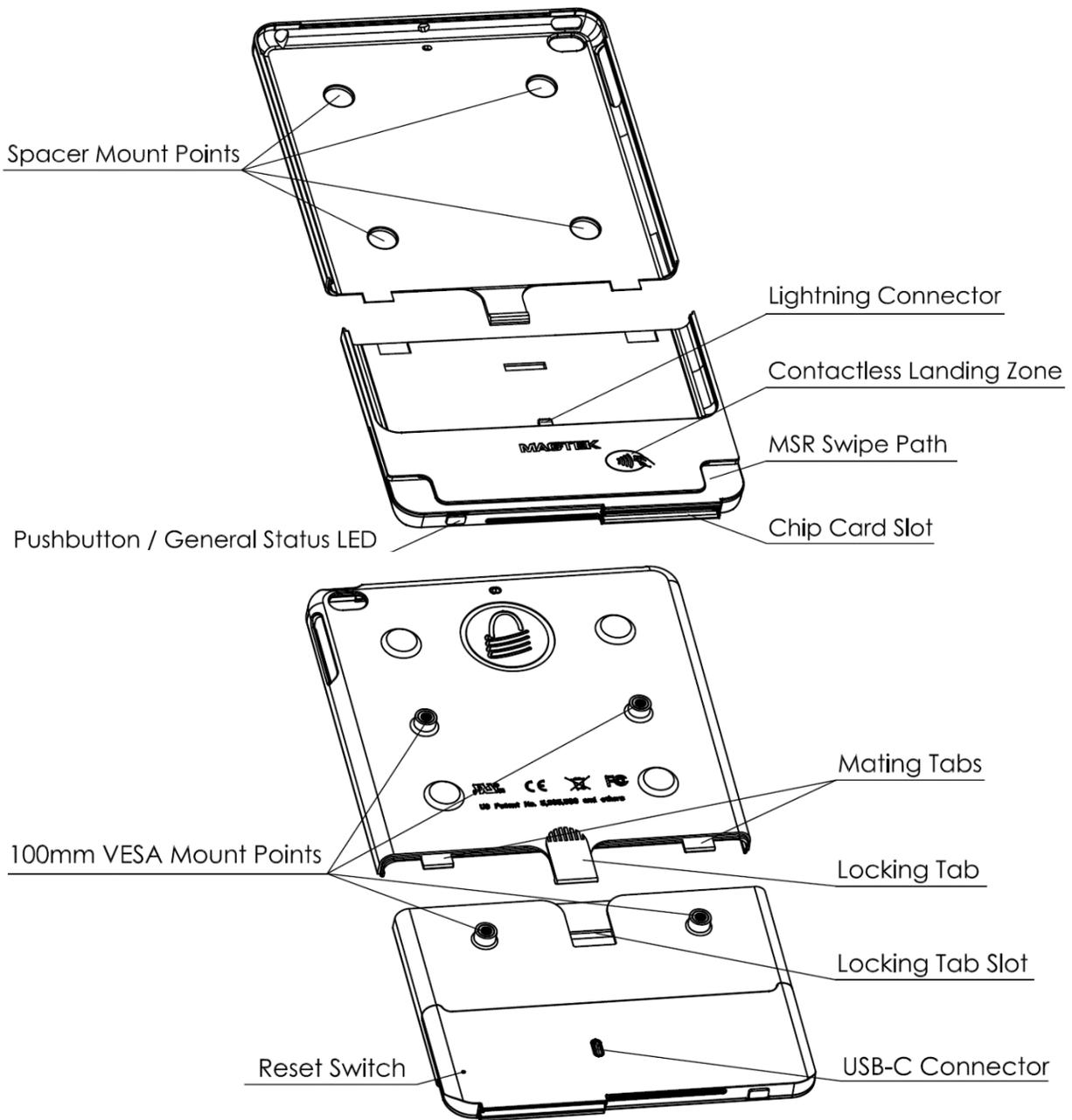
Figure 1-2 - kDynamo Air Major Components

1.6   About Terminology

In this document, kDynamo is referred to as the **device**. It is designed to be connected to a **host**, which is a piece of general-purpose electronic equipment which can send commands and data to, and receive data from, the device. Host types include PC computers/laptops, tablets, and smartphones. Generally, the host must have **software** installed that communicates with the device and is capable of processing transactions. During a transaction, the host and its software interact with the **operator**, such as a cashier or bank teller, while the device interacts with the **cardholder**.

1.7   About Solution Planning

Smooth deployment of a kDynamo solution requires some up-front planning and decision-making:

- Determine the overall **functional requirements** and desired **user experience** of the solution kDynamo will be integrated into. For example, how kDynamo and its host will be physically **presented** to the cardholder. This includes whether the solution will be handheld or permanently mounted in a stand or enclosure, and whether the solution is intended to be used in portrait or landscape orientation (kDynamo can be used in either orientation). When planning placement, be sure to consider:

  a) **Power source availability**. For example, permanently mounted solutions should be within reasonable cabling distance from the power source; handheld solutions need a designated secure location with charging power available.

  b) **Ergonomics**. For example, make sure there is adequate clearance for operators or cardholders to easily find the critical components of the device, and to insert, swipe, or tap a card, or to tap a contactless payment device.

- Determine what **documentation** and **training** will be required from solution design through testing and field deployment. For example, it may be necessary to develop a solution-specific installation procedure for technicians, and training materials for operators.

- Determine what type of **host** kDynamo will connect to. kDynamo Air is Made for iPad (4th, 5th, and 6th generation), iPad Pro (9.7-inch), iPad Air, and iPad Air 2. kDynamo mini for is Made for iPad mini (2, 3, 4, and 5), and offers two models depending on which model of iPad mini will be attached. See **Table 1-1** for a list of available devices and the hosts they are designed to fit. When planning, include any additional support or devices required by the host, such as physical locations, mounting, and power connections.

- Determine how the host and kDynamo will be **mounted**. For details, see section **2.3 Mounting**.

- Determine what **software** will be installed on the host and how it will be configured. Software can include operating system, transaction processing software, security software, and so on. Include any additional support required by the software, such as network connections.

- Determine how kDynamo should be **configured**, and specify that when you order devices. MagTek or your reseller can advise. For deep detail about configuration options and how they affect device behavior, see *D998200230 KDYNAMO PROGRAMMER'S MANUAL (COMMANDS)*.

- Determine what the solution will use as a **primary power source**. kDynamo can be permanently powered through the USB connector, or can be powered by its internal rechargeable battery and periodically recharged. If using the rechargeable battery, determine the **battery recharge schedule(s)**. For example, in high-traffic mission-critical solutions, it may be wise to keep spare devices configured and charged for fast swap-out.

- Determine how kDynamo will be **branded**. In large quantities, MagTek can accommodate custom branding colors and trade dress. Contact a representative for details.

- Determine how the solution will be **tested** and, if appropriate, how it will be **certified**.

- Determine how the solution will be **maintained**. See section **4 Maintenance** for guidance on maintaining the kDynamo portion of the solution.

- Determine how the solution will be **regularly inspected** for tampering, unauthorized added components such as eavesdropping or skimming devices, and so on. Proper inspection requires additional solution-specific training, instructions, and visual references.

Table 1-1 - Available Models and Accessories

Part Number	Description
21097101	kDynamo Air, Made for iPad (4th, 5th, and 6th generation), iPad Pro 9.7-inch, iPad Air, and iPad Air 2
1000003039	kDynamo Air adapter shell for iPad Air, iPad Air 2, iPad Pro 9.7-inch, iPad (5th and 6th generation), included with 21097101
90800008	kDynamo Air spacers for iPad Pro 9.7-inch, iPad Air 2
21097102	kDynamo mini with adapter shell for iPad mini (4 and 5)
1000003562	kDynamo mini adapter shell for iPad mini (4 and 5), included with 21097102
21097103	kDynamo mini with adapter shell for iPad mini (2 and 3)
1000002295	kDynamo mini adapter shell for iPad mini (2 and 3), included with 21097103
1000005076	kDynamo Air and kDynamo mini cable to use with Apple USB power adapter included with iPad host, included with all models

2   Installation

Installing kDynamo is a straightforward process: The acquirer configures the encryption keys and EMV terminal / payment brand settings before deployment. End users need only set up a host with appropriate software, configure the software, and connect the device to the host. This section provides general information about setting up solutions that incorporate kDynamo, including host software, connecting the device, and mounting the device.

2.1   About Host Software

In any solution, kDynamo is connected to a **host**, which must have software installed that knows how to communicate with the device, and which is capable of performing actions intended to be carried out when a cardholder swipes, inserts, or taps a card or contactless payment device. To set up the host software to work with kDynamo, follow the installation and configuration instructions provided by the vendor of the host or the host software. For details about developing host software, see section **5 Developing Custom Software**.

Some connection types may also require installation of device drivers on the host. To set up any necessary drivers, see the connection-specific "How To" sections in section **2.2 Connecting to a Host**.

2.2   Connecting to a Host

kDynamo connects to an iPad host via the Lightning connector. An additional adapter shell, which is included with each device and which varies based on the iPad model being used, snaps on to kDynamo to secure and surround the host.

To connect kDynamo to an iPad host, follow these steps:

1) Make sure you have the correct adapter shell for the model of iPad you are connecting to. Check the label on the adapter shell against the list of available accessories in section **1.7 About Solution Planning**.

2) If you are connecting kDynamo Air to iPad Pro 9.7-inch or iPad Air 2, install the four included spacers in the spacer mount points inside the adapter shell (see section **1.5 About kDynamo Components**). Make sure they are fully adhered and will not shift.

3) Plug the main body of kDynamo into the host's Lightning connector.

4) Slide the iPad into the bottom of the adapter shell, then slide it all the way in until the adapter shell mates with the kDynamo main body. The locking tab should engage on its own.

5) Pull gently on the two halves to make sure they are secured.

6) On the host, install and configure the host software you intend to use with kDynamo. If you do not yet have host software, you can download a test tool from the App Store called **MagTek Test**, published by **MagTek, Inc.**, to perform simple tests.
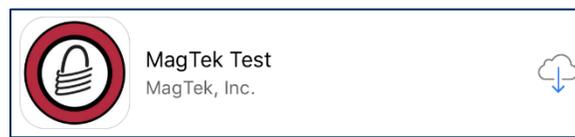
   a) Make sure the host software is configured to look for the device on the proper connection type.

   b) Make sure the host software is configured to look for the correct device.

   c) Make sure the host software is configured to properly interpret incoming data from the device.

7) Make sure kDynamo is powered on, is not in Sleep Mode, and that its battery is adequately charged (see section **3.4 Power Management** for instructions).

8) Use the host software or the **MagTek Test** app to test swiping, inserting, and tapping a card. For details about reading each payment type, see section **3.5 Card Reading**. If you are using the **MagTek Test** app, follow these steps:

   a) At the bottom of the app, select **Lightning EMV**.

   b) Press the **Connect** button. If the host successfully connects, the main reporting area of the app will say **Connected…**.

   c) EMV transactions require the device's clock to be set before processing. The device does not have a battery-backed clock, so it must be set by the host software. If you are using the **MagTek Test** app, push the host's date and time to the device by pressing the **Options** button and pressing the **Set Date Time** button.

   d) Before testing a swipe, use the app to **Send** command **580101** to the device and receive response **0000** to enable the magnetic stripe read head. For convenience, the **MagTek Test** app provides an **MSR On** button that sends this command to the device with a single press.

   e) After swipe testing, **Send** command **580100** to disable it and conserve power.

To disconnect kDynamo from the host, follow these steps:

1) Make sure all installed apps that use kDynamo are either closed or disconnected.
2) Power off kDynamo (see section **3.4.4 How to Power On / Wake Up from Sleep Mode / Power Off)**.
3) Turn off the iPad host's display to avoid accidentally launching or interacting with apps.
4) Use your fingernail or gently use a slotted screwdriver to lift the locking tab.
5) Pull kDynamo's adapter shell and main body in opposite directions.
6) Disconnect kDynamo from the Lightning connector and slide the iPad host out of the adapter shell.

2.3   Mounting

2.3.1 How to Mount kDynamo Air

kDynamo Air's design provides a 100mm VESA standard mounting pattern on the rear of the device (see section **1.5 About kDynamo Components**), which the solution design can use in a variety of ways:

- The device can be entirely handheld by using a commercially available 100mm VESA hand strap.

- The device can be permanently mounted to a stand on a countertop by using a commercially available 100mm VESA stand.

- The device can be used in a hybrid grab-and-go configuration with custom holder / stand designs.

Figure 2-1 provides overall dimensions and hole spacing / placement details to assist with planning and integration.
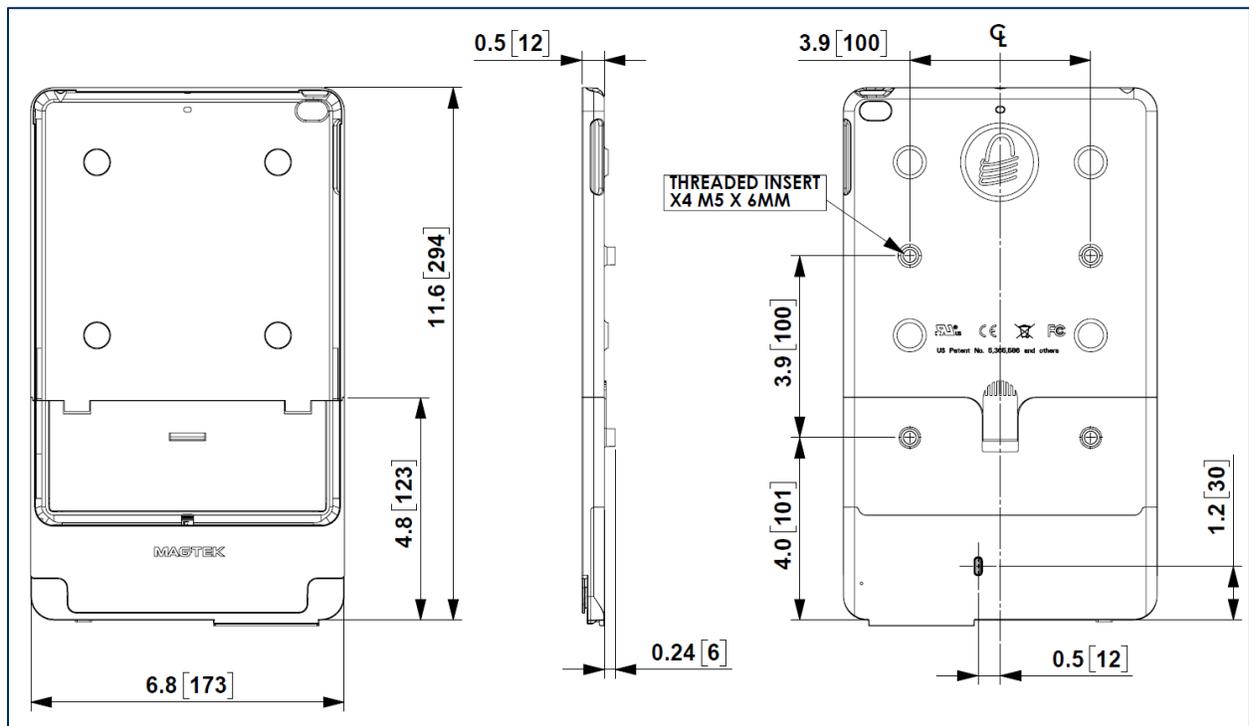
Figure 2-1 - kDynamo Air Overall Dimensions and 100mm VESA Hole Placement, in Inches [mm]

2.3.2 How to Mount kDynamo mini

Both models of kDynamo mini are primarily designed to be handheld. Depending on solution design requirements, designers may choose to add a commercially available adhesive-mounted hand strap, or other adhesive-mounted custom components.

Figure 2-2 provides overall dimensions of the device to assist with planning and integration.
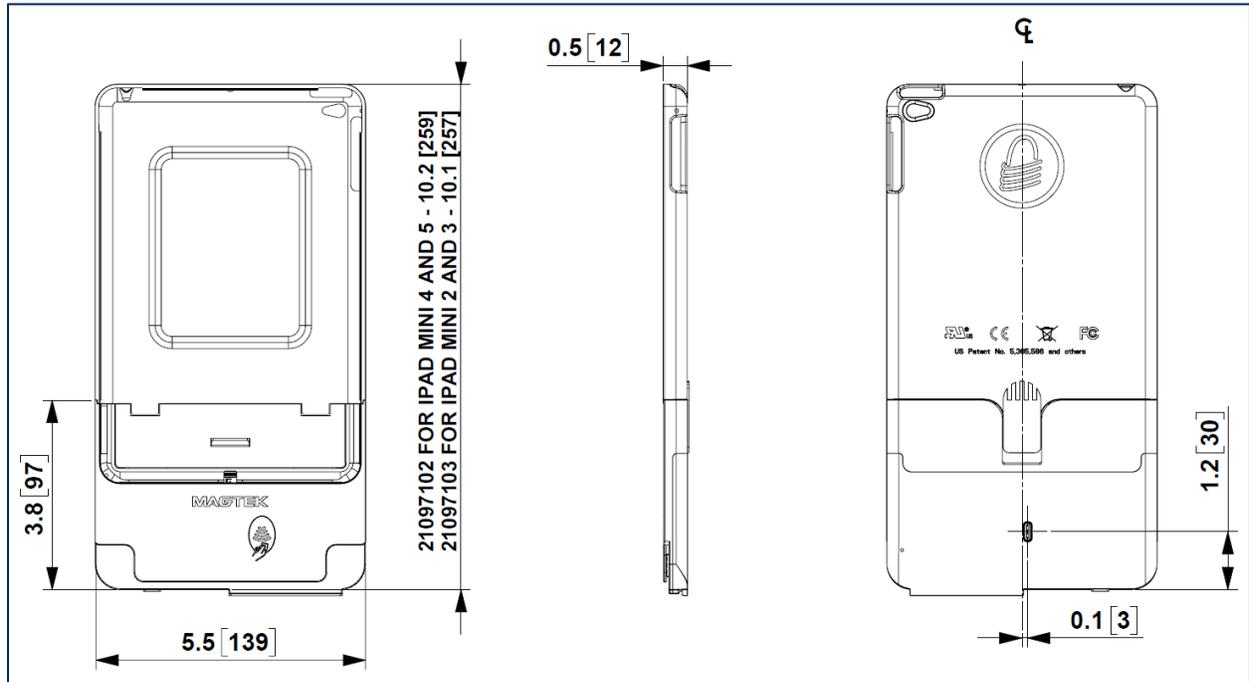

Figure 2-2 - kDynamo mini Overall Dimensions in Inches [mm] (21097103 Shown)

3   Operation

3.1   About Operating Modes

During operation, kDynamo transitions between distinct modes, each of which behaves differently:

- **Reset Mode** occurs when the user presses and the recessed reset switch. After resetting, the device progresses to Powered Off Mode. If the device is connected to USB power, it immediately progresses to Idle Mode.

- **Powered Off Mode** is the shipping mode of the device. The operator can power off by holding the pushbutton for 2 to 3 seconds. The device also enters this mode automatically if it has been in Sleep Mode for a configurable timeout period. When powered off, the device consumes practically no power. To move the device from Powered Off Mode to Idle Mode, press the pushbutton briefly or connect the device to USB power. When the device is connected to USB power, the device immediately progresses to Idle Mode.

- **Idle Mode** is the device's normal waiting state. The operator activates this mode by briefly pressing the pushbutton once while in Powered Off Mode, or connecting the device to USB power. In this mode, the device is ready to connect to an iOS host. If the device is not connected to USB power, it will move from Idle Mode to Sleep Mode automatically when its configurable timeout period has passed. kDynamo automatically progresses from Idle Mode to Connected Mode when the iOS host has established an iAP2 session.

- **Connected Mode** occurs when the iOS host has established an iAP2 session with kDynamo. In this mode, the host and the device can both initiate communication. It is the host's responsibility to terminate the iAP2 session and send the device into Sleep Mode to save power when an active data connection is no longer needed. If the device is not connected to USB power, it will automatically move from Connected Mode to Sleep Mode when its configurable Sleep Mode timeout period has passed. Doing so does not automatically or immediately terminate the iAP2 session with the host.

- **Sleep Mode** is a low-power standby state. The host initiates this mode by closing its iAP2 session with the device, which generally happens automatically when the host enters sleep mode, and may also be initiated directly by the host software. The device also enters this mode automatically when it is not connected to USB power and has been unused (no user input, no communication with the host) for a configurable timeout period. Operators can move the device from Sleep Mode to Idle Mode by pressing the pushbutton briefly or connecting the device to USB power. The host can move the device from Sleep Mode to Connected Mode by opening an iAP2 session. The device automatically moves from Sleep Mode to Powered Off Mode when its configurable Power Off timeout period has passed.

3.2   About the General Status LED

kDynamo's **General Status LED**, integrated into the pushbutton (see section **1.5 About kDynamo Components**), provides feedback to the operator and cardholder about the internal state of the device . **Table 3-1** shows how to interpret the flashing patterns of the General Status LED.

Table 3-1 - kDynamo General Status LED Meanings

Color	Flashing Pattern		Meaning
Off	Off	——	The device is powered off, or the battery is completely drained and needs to be recharged.
Blue	Off / Flash 1 Time		The device is not charging, and its battery is fully charged. Recharge if desired.
Blue	Off / Flash 2 Times		The device is not charging, and its battery is at medium charge. Recharge soon.
Blue	Off / Flash 3 Times		The device is not charging, and its battery is critically low, and it can not process transactions. Recharge immediately.
Blue	On / Flash Off 4 Times		The device is charging, and its battery is charged to below 50% capacity.
Blue	On / Flash Off 3 Times		The device is charging, and its battery is charged to between 50% and 70% capacity.
Blue	On / Flash Off 2 Times		The device is charging, and its battery is charged to between 70% and 90% capacity.
Blue	On / Flash Off Once		The device is charging, and its battery is charged to above 90% capacity.
Blue	Solid On	——	There are three conditions where the General Status LED turns solid on: • The device is in Sleep Mode. • An operator is updating the firmware. After completion, the device resets and returns to normal operation. • The operator is holding the pushbutton down. This provides feedback that the pushbutton is working correctly.

3.3 About Sounds

kDynamo's beeper provides feedback to operators and cardholders about the internal state of the device:

- The device sounds one short beep on startup to test the beeper and indicate the device is powered on.
- The device sounds one short beep after it has successfully read a contactless tap, and the cardholder can safely remove the card or device from the contactless landing zone.
- The device sounds two beeps when an operator cancels a pending EMV transaction.
- The device sounds two short beeps when an operator successfully powers it off.

3.4   Power Management

3.4.1   About Power

This device incorporates a built-in Lithium-ion rechargeable battery, which requires very little maintenance. It is not subject to "charge memory" and therefore does not require deep discharge cycles to restore its charge capacity like many other battery technologies.

When properly powered through its USB port, the device powers on automatically, recharges the battery, powers the connected iPad host through the Lightning port, and remains powered on (see section **3.4.3 How to Charge the Battery and Connected Host**). While charging, the device consumes more power from the USB connection than when the battery is fully charged. The device stops charging the battery when it determines it is optimally full, to prevent overcharging.

If the device is not connected to USB power, or if the USB connection does not provide enough power, the device primarily powers itself using the rechargeable battery. In this case, after a configurable period of inactivity (no host commands and no user interaction), the device transitions to a low-power Sleep Mode, which it indicates by turning the General Status LED solid on. After the device has been in Sleep Mode for a configurable period of continued inactivity, the device powers off completely. The host can set the device's Sleep Mode and Power Off timeouts to values that are appropriate for the specific solution design. For details about developing host software to configure the device, see section **5 Developing Custom Software**. For details about the device's behavior in its various power modes, see section **3.1 About Operating Modes**. For instructions to check and recharge the battery, to power the device on and off, and to wake the device from Sleep Mode, see the following sections.

The device also draws a trickle of power from the connected iPad host to power the magnetic stripe reader head, if the head is powered on. The host may optionally send a command to turn the head off when it is not in use to save power (see section **5 Developing Custom Software**).

The device's rechargeable battery is designed to last hundreds of charging cycles, but with time and / or with use, its charge capacity will naturally degrade. To maintain the battery's charge capacity as much as possible, follow these guidelines:

- Do not discharge the battery to 0%. Full discharge shortens the battery life.
- When possible, plan to recharge the battery well before it is fully depleted.
- Store the device at the lowest reasonable temperatures within its specified storage temperature range (see **Appendix A Technical Specifications**; below 77°F / 25°C is optimal). Temperature is the most critical factor in extending battery life.
- Store the device with the battery charged to less than 100% (40% is optimal).

3.4.2   How to Check Battery Level

To check the charge level of the device's rechargeable battery, make sure the device is powered on and awake. The General Status LED blinks more frequently as the need to recharge becomes more urgent. During charging, the General Status LED blinks less frequently as the battery charges. For details, see section **3.2 About the General Status LED**).

Custom host software may also query the device and show its current charge level on the host display at all times for convenience. For details, see section **5 Developing Custom Software**.

3.4.3   How to Charge the Battery and Connected Host

⚠ CAUTION
To avoid possible damage to the host or the device, only use an Apple USB power adapter designed for the iPad host you are using, and the cable included with kDynamo.

Periodically recharge kDynamo's battery and the connected iOS host by using the included USB-C cable to connect it to the Apple USB power adapter included with the iPad host.

The device requires a USB connection that can provide at least **2.4A @ 5V (12W)**. The device automatically powers off if the battery level is too low to reliably process a transaction. A full recharge cycle for a completely drained battery, regardless of whether kDynamo is pass-through charging a connected iPad host, takes approximately 4 to 5 hours.

3.4.4   How to Power On / Wake Up from Sleep Mode / Power Off

In Powered Off mode (General Status LED is off) or in Sleep Mode (General Status LED is lit solid), power on or wake the device by tapping the pushbutton. In response, the device lights the General Status LED, then beeps once, and transitions to either Idle Mode or Connected Mode. For details, see section **3.1 About Operating Modes** and section **3.2 About the General Status LED**.

To power off the device, press and hold the pushbutton for 2 to 3 seconds until the General Status LED turns off and the device beeps twice.

3.4.5   How to Force Reset

To force the device to reset, use a small tool such as a paperclip to carefully press the reset switch recessed inside the small hole on the back of the device (see Figure **1-1**).

3.5   Card Reading

3.5.1   About Reading Cards

The steps for starting a transaction and reading a card or contactless payment device are different depending on kDynamo's configuration and on the design of the host software. Host software developers should see section **5 Developing Custom Software** for implementation references. The solution developer should provide solution-specific instructions for operators to follow. A transaction generally follows this essential flow:

1) An advanced operator makes sure kDynamo is configured properly and is connected to the host (see section **2.2 Connecting to a Host**).

2) When the device is powered by the USB-C connector, the host may always keep a connection open to the device. When the device is not connected to USB power, the host would generally open a session with the device to process a transaction, then close the session after the transaction is complete to transition the device to Sleep Mode and conserve power.

3) The operator makes sure kDynamo is receiving power either from its rechargeable battery or from the USB-C connector, and is awake and powered on (see section **3.4.4 How to Power On / Wake Up from Sleep Mode / Power Off** and section **3.2 About the General Status LED**).

4) The operator uses the host user interface to finalize a transaction amount, then initiates a transaction.

5) The host communicates with the device, and reports to the operator when the device is ready.

6) The operator directs the cardholder in presenting payment.

7) The cardholder interacts with the device to present payment. The following sections provide additional details about presenting each of the available payment methods.

8) Because the device does not have its own display, the device may send messages to the host prompting the cardholder to perform certain actions; the host software should process these requests by displaying the requested messages, and depending on the placement of the host display(s), the operator may need to relay the messages to the cardholder. For example:

   a) If the device can not read the card, it may prompt the cardholder to swipe, insert, or tap again.

   b) If the device repeatedly can not read a chip card, it may revert to using the magnetic stripe reader instead of the chip card slot. This is known as **EMV fallback**.

9) The device reports the success or failure of the transaction to the host, which should report the results to the operator.

3.5.2 How to Swipe Magnetic Stripe Cards

Cardholders should swipe magnetic stripe cards in the MSR swipe path with the magnetic stripe facing away from the cardholder and into the device, as shown in **Figure 3-1**. Cardholders may swipe in either direction along the path.

Figure 3-1 - Swiping a Card Through kDynamo

3.5.3 How to Insert Contact Chip Cards

Cardholders should insert chip cards into the chip card slot with the chip facing the cardholder and toward the slot, as shown in **Figure 3-2**.
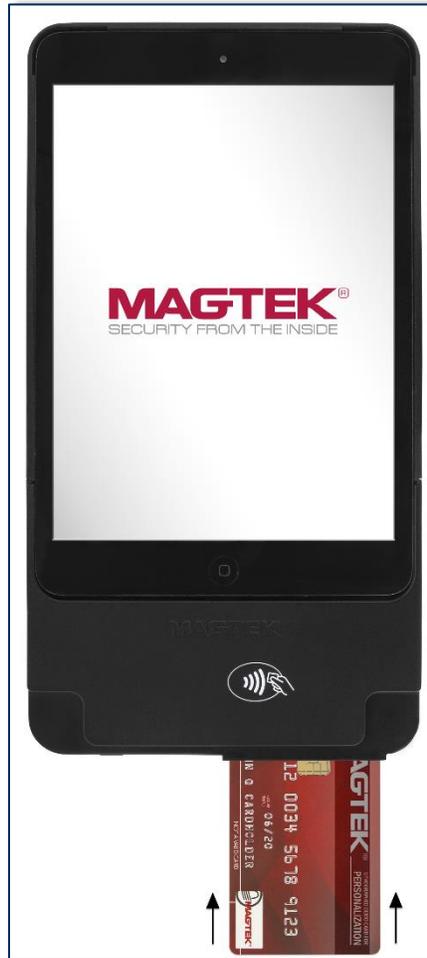
Figure 3-2 - Inserting a Chip Card Into kDynamo

3.5.4 How to Tap Contactless Cards / Devices

To tap a contactless card or electronic payment device, cardholders should do the following:

1) If the cardholder is using an electronic payment device, such as a smart phone, make sure the payment device has **NFC** turned **On** and has a payment app configured to process transactions. For details, see the documentation provided by the smart phone manufacturer and payment app publisher.

2) Wait until the host software indicates it is ready for a tap.

3) Tap the card or electronic payment device on the contactless landing zone, indicated by the EMVCo Contactless Indicator on the device's face (see **Figure 3-3**). The card or device must be centered over the contactless landing zone, and the long edge of cards must be parallel / aligned with the long edge of kDynamo. Cards rotated the wrong way may not read correctly.

4) Wait for the device to beep. The host software may also display progress showing whether the tap succeeded or failed. Because each smart phone model may have its NFC antenna placed differently, the ideal tap position may vary by make and model. For example, Samsung users may need to center the phone on the contactless landing zone, while iPhone users may need to tap the top of the phone on the contactless landing zone.

5) Remove the card or electronic payment device from the contactless landing zone.

Figure 3-3 - Tapping a Contactless Card or Smart Phone On kDynamo

4   Maintenance

MagTek's double-sided cleaning card *96700004* is designed to clean the magnetic read head in the MSR swipe path and the contact pins inside all chip card contact readers. Keeping both of these components clean is essential to the device's functioning. MagTek recommends swiping and inserting a cleaning card once per week to avoid credit card misreads.

⚠ CAUTION
To avoid damaging the read head, only clean the card path with approved cleaning cards. DO NOT use liquid cleaning products or insert any other objects into the device.

5   Developing Custom Software

Custom host software uses the same underlying device command set to communicate with all available kDynamo models. This section provides high-level information about communicating with the device, and provides pointers to select API references and sample code.

Developers of custom host software that implements contactless transactions should refer to *EMV Contactless Specifications for Payment Systems, Book A, Architecture and General Requirements* for user interface requirements that may need to be met by the host software. For example, because kDynamo has a single General Status LED and does not have a display, the MagTek Demo app demonstrates using the host's display to emulate the standard four-LED contactless tap sequence.

5.1   Lightning-Based Custom Software

MagTek produces software development kits (SDKs) with API libraries that provide higher-level functions wrapped around Lightning communication protocols. These libraries simplify the development of custom host software that interfaces with kDynamo. See *99510111 DYNAMAX / EDYNAMO / UDYNAMO / ADYNAMO / IDYNAMO / KDYNAMO / SDYNAMO / TDYNAMO SDK FOR IOS*. All product software and documentation is available from www.magtek.com.

In addition to MagTek's SDK API libraries, custom host software can communicate directly with the device using Apple's *ExternalAccessory* Framework, with sample code available in the form of Apple's *EADemo* app. For details, see *Apple Developer Documentation* and *D998200230 KDYNAMO PROGRAMMER'S MANUAL (COMMANDS)*.

5.2   For More Information

For more information about developing custom host software that integrates with kDynamo, see the MagTek website or contact your reseller or MagTek Support Services.

Appendix A   Technical Specifications

kDynamo Technical Specifications	
Reference Standards and Certifications	
Identification Cards Financial Transaction Cards (ISO 7813) AAMVA EMV ICC Specifications for Payment Systems Ver 4.3, L1 Contact and L2 Contact Encryption: TDEA (3DES)-CBC using DUKPT FCC Title 47 Part 15 Class B CE Level B EMC UR/CUR UL Recognized California Proposition 65 (California) EU Directive Waste Electrical and Electronic Equipment (WEEE) EU Directive Restriction of Hazardous Substances (RoHS) Universal Serial Bus Specification 2.0, compatible with 1.1 MasterCard TQM Label Certified	
Physical Characteristics	
Dimensions (H x W x T)	kDynamo mini for iPad mini 4 and 5: 10.2 in. (259 mm) x 5.5 in. (139 mm) x 0.5 in. (12 mm) kDynamo mini for iPad mini 2 and 3: 10.1 in. (257 mm) x 5.5 in. (139.0 mm) x 0.5 in. (12 mm) kDynamo Air: 11.68 in. (296.7 mm) x 6.83 in. (173.4 mm) x 0.72 in. (18.4 mm)
Weight	kDynamo mini w/adapter shell for iPad mini (2 and 3): 6.5 oz. (183.2g) kDynamo mini w/adapter shell for iPad mini (4 and 5): 7.0 oz. (200.0g) kDynamo Air w/adapter shell, no spacers: 8.0 oz. (225.4g)
Supported Mounting Options	kDynamo mini: Handheld with iPad mini (2, 3, 4, and 5). Supports third-party adhesive-mounted hand strap. kDynamo Air with iPad (4th, 5th, and 6th generation), iPad Pro (9.7-inch), iPad Air, and iPad Air 2 • Handheld • 100mm VESA mount points for third-party stands or hand straps
Card Read Characteristics	
Magnetic Stripe Reader	Bidirectional 3 track encrypting IntelliHead magnetic stripe reader (MSR) with MagnePrint
Magnetic Stripe Decoding	Financial (ISO Type B), AAMVA, or Other ISO 7810, 7811
Acceptable Swipe Speeds	4 inches per second to 60 inches per second

kDynamo Technical Specifications	
Chip Card Reader	EMVCo L1 and L2 Contact Reader Terminal type 21 and 24 with ODA Terminal type 21 and 24 without ODA
Contactless Reader	EMVCo L1 and L2 Contactless Reader D-PAS, MCL, payWave, ExpressPay, Apple Pay
User Interface Characteristics	
Status Indicators	General Status LED (Blue)
Display Type	Not Applicable
Display Size (viewable area)	Not Applicable
Display Resolution	Not Applicable
Keypad	Not Applicable
Security Characteristics	
Ingress Protection	Not Applicable
Tamper Protection	Tamper Evident Enclosure
Code Protection	Signed firmware. The device will not allow a host to install firmware that is not properly signed by an authorized source.
Eavesdrop Protection	Not Applicable
Electrical Characteristics	
Power Inputs	USB-C connector Lightning connector (for MSR read head)
Battery Type	Rechargeable Lithium Polymer (LiPo)
Battery Capacity	760 mAH nominal
Battery Charge Time	Approximately 4 to 5 hours to full charge
Battery Time, Powered Off	Up to 2 years (time from 60% charge to 0% charge)
Battery Time, Idle	Up to 10 hours
Battery Time, Sleep Mode	Up to 24 hours
Battery Time, Transactions	Over an 8 hour shift, with all payment methods enabled per transaction, and a new battery fully charged: • Over 140 15-second transactions • Over 200 10-second transactions • Over 400 5-second transactions
Voltage Requirements	5 VDC on USB power

kDynamo Technical Specifications	
Average Current Draw	From USB Connector: 270 mA (connected mode with swipe/contact/contactless enabled) Additional draw (~1A, depends on host) when charging host's battery From iPad host: 37mA when magnetic read head is on; 0mA otherwise
Data Storage	Not Applicable
Host Connection Characteristics	
Wired Connection Types	Lightning iAP2
Wireless Connection Types	Not Applicable
Wireless Connection Frequency	Not Applicable
Software Characteristics	
Tested Operating System(s)	iOS 7.1 and above
Environmental Tolerance	
Operating Temperature	32°F to 113°F (0°C to 45°C)
Operating Relative Humidity	10% to 90% without condensation
Storage Temperature	32°F to 113°F (0°C to 45°C)
Storage Relative Humidity	10% to 90% without condensation
Vibration Resistance	Not Applicable
Shock Resistance	No separation of covers or damage to internal components after six surface drops and four corner drops 3 feet onto concrete surface
Reliability	
Shelf Life	Minimum 4 years
Magnetic Read Head Life	100,000 card swipes
ICC Read Head Life	100,000 card insertions
Battery Shelf Life	Minimum 4 years for rechargeable battery
Battery Cycle Life	500 full discharge / recharge cycles