EP10

HAND-HELD COMPUTER

HDK User Manual

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Part No. 8000255.A

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Quality Management System

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Appendix C: HDK License Agreement

1 INTRODUCTION

1.1 About This Manual

This manual provides guidance on using the EP10 HDK to create peripherals that attach to the docking connector of the Psion EP10 hand-held computer. The manual is organised into the following chapters:

Chapter 1: Introduction
provides an overview of the EP10 Hand-Held Computer and the EP10 HDK.

Chapter 2: Hardware
describes, in general terms, the hardware of EP10.

Chapter 3: Software
gives an overview of the registry entries and API for controlling peripherals and the installation of device drivers.

Chapter 4: Mechanical Considerations
describes the physical considerations of designing peripherals.

Chapter 5: Connections
describes the physical and electrical aspects of the docking connector of the EP10, and of the connectors available on the EP10 snap modules.

Chapter 6: HDK Demo Application
describes the features and functions of the HDK Demo application program.

Appendix A: Resources
lists extra resources which may be of use in conjunction with the HDK.

Appendix B: EP10 Specifications
lists the specifications of the EP10.

Appendix C: HDK License Agreement
provides the license agreement that is assumed by using the EP10 HDK.

1.2 Text Conventions

The following conventions and syntax are followed throughout this document:

Note: Notes highlight additional helpful information.

Important: These statements provide important instructions or additional information that is critical to the operation of the computer or other equipment.

Warning: These statements provide important information that may prevent injury, damage to the equipment, or loss of data.

An arrow next to field description information (usually in tables) indicates a recommended or suggested configuration setting.

1.3 About the HDK

The EP10 HDK (Hardware Development Kit) provides the software tools and technical information necessary to design and integrate peripherals for your EP10 hand-held computer.

The docking connector on the EP10 provides access to USB and serial interfaces for connecting to standard devices (barcode scanners, imagers, RFID readers, etc.).

3D model files and 2D schematic drawings are provided which give the precise measurements needed for designing custom devices that fit snugly with the main housing around the docking connector.

Finally, the EP10 HDK API library provides the software tools necessary to access and control the peripheral attached to the docking connector.

1.4 Development Platform

The EP10 API library is designed for application development using Visual Studio 9 (2008).

1.5 Contents of the HDK

The HDK (Hardware Development Kit) for EP10 includes the following items:

- This manual.
- Installer for development files, including C header files for managing peripherals and HDK Demo application. See Section 3.7 EP10 HDK Application Development Software and Section 3.8 EP10 HDK Demo Application for more details on these files.
- 2D drawings and 3D models of the EP10 outer shell, and existing EP10 snap modules for reference.

1.5.1 Files in the HDK

The following files are included with the EP10 Hardware Development Kit:

Table 1.1 Files in the HDK

Filename	Description
Software Development Files	
Hdk7515.h	EP10 HDK header file
Hdk7515Const.h	EP10 HDK constants header file
7515HDK.exp	EP10 HDK export file
7515HDK.lib	EP10 HDK library file
7515HDK.dll	EP10 HDK dynamic link library
EP10 HDK Demo Application	
EP10HDKDemo.exe	EP10 HDK demo application
EP10HDKDemoSrc.zip	Zip file containing the source code of the demo application
2D Schematic and 3D Model Files	
EP10.stp	3D step file of the EP10 external case
EP10_Case_Front.pdf	2D drawing of EP10 front case
EP10_Case_Rear.pdf	2D drawing of EP10 rear case
Serial_SnapOn.stp	3D step file of the DE9 RS-232 snap module assembly
Serial_SnapOn_Lower.pdf	2D drawing of the lower housing of the DE9 RS-232 snap module
Serial_SnapOn_Upper.pdf	2D drawing of the upper housing of the DE9 RS-232 snap module
Snap_On_Latch_Left.pdf	2D drawing of the left latch for an EP10 snap module
Snap_On_Latch_Right.pdf	2D drawing of the right latch for an EP10 snap module
USB_SnapOn_Lower.pdf	2D drawing of the lower housing of the USB snap module
USB_SnapOn_Upper.pdf	2D drawing of the upper housing of the USB snap module
USB_SnapOn.stp	3D step file of the USB snap module assembly
Serial_SnapOn_Schematics.pdf	Electrical schematics of the DE9 RS-232 snap module
USB_SnapOn_Schematics.pdf	Electrical schematics of the USB snap module
Documentation	
licenseagreement.doc	Psion HDK License Agreement document
Psion EP10 HDK User Manual	This document (P/N 8000255)

1.6 Obtaining the HDK

The EP10 HDK is available for download on the Psion Community website (http://community.psion.com). You will need an account on the website in order to download files. An account can be easily created by clicking on the **Join** link in the upper right corner of the home page.

To download the HDK:

1. Click on the **Downloads** link in the top bar of the Community home page.
2. Click on **Psion HDK** in the list that appears.
3. Click on **Hardware Development Kit (HDK) for EP10**.
4. Click on the link to view the license agreement and download the .zip file containing the HDK files.
5. Open the .zip file and extract the files within to a folder on your PC hard drive.

To continue with installing the HDK files required for developing applications to work with your peripherals, see Section 3.7 EP10 HDK Application Development Software.

1.7 About the EP10 Hand-Held Computer

The EP10 hand-held computer is a small and durable PDA device that has been built to withstand challenging weather and environmental conditions. EP10 uses the Microsoft® Windows® Embedded 6.5 operating system.

For more information on the EP10 operation, refer to the EP10 Hand-Held Computer User Manual (P/N 8000227).

2 HARDWARE

2.1 Overview

This chapter gives an overview of the hardware of EP10.

2.2 Hardware Variants

2.2.1 Keyboard Variants

EP10 has three standard variants for the keyboard layout: numeric, QWERTY and AZERTY.

Numeric Keyboard

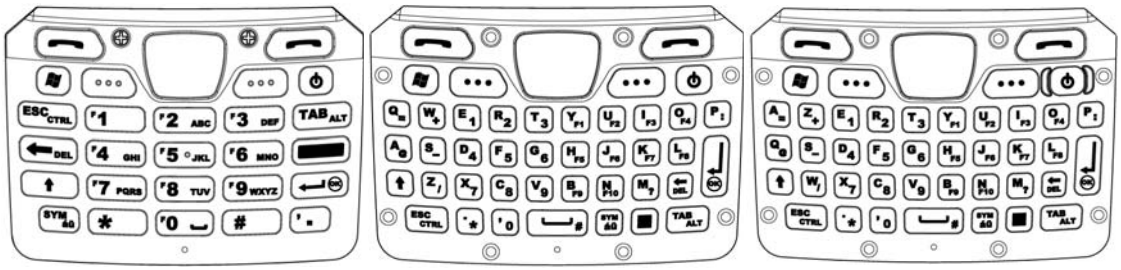
This numeric keyboard has the number keys arranged telephone-style, with the numbers *1*,*2*,*3* along the top row. The alphabetic characters are also arranged telephone-style, in groups of 3 or 4 [FN]-shifted characters on the number keys.

QWERTY Keyboard

This alphabetic keyboard has the alpha keys arranged in standard QWERTY layout. The number keys are accessed as [FN]-shifted characters on the left-middle side of the keyboard, and are arranged telephonic-style, with the numbers *1*,*2*,*3* along the top row (on the *E*, *R*, and *T* keys, respectively).

AZERTY Keyboard

This alphabetic keyboard has the alpha keys arranged in the AZERTY layout favoured by many French-speaking parts of Europe. It is identical to the QWERTY keyboard in all respects except that the locations of the *Q* and *W* keys are interchanged with the *A* and *Z* keys, respectively.



2.2.2 Barcode Scanner/Imager Variants

EP10 comes standard with no barcode scanner/imager installed. An optional EA11 2D imager is available. Specifications of the EA11 imager can be found in Appendix B: "EP10 Specifications".

2.2.3 WWAN Radio Variants

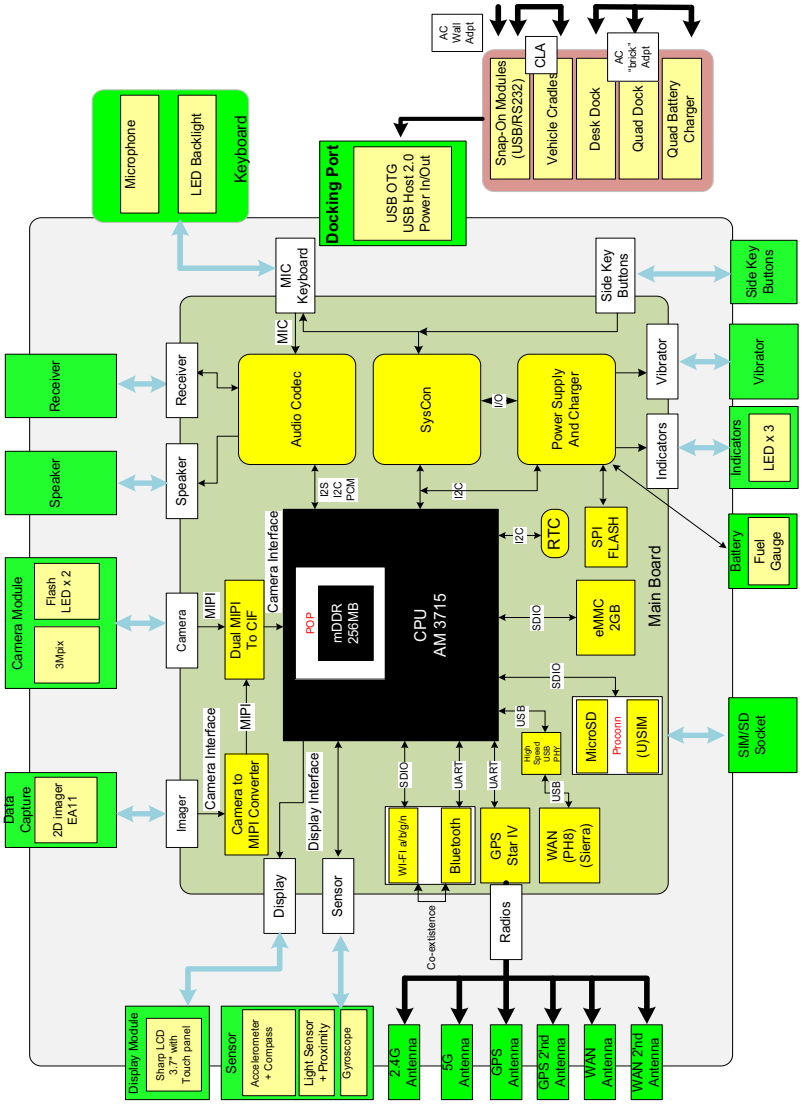
The EP10 is available with one of the following Wireless WAN (WWAN) radio options:

- Cinterion PH8 GSM/UMTS (worldwide)
- Sierra Wireless MC5728v CDMA Sprint (US)
- Sierra Wireless MC5728v CDMA Verizon (US)

Specifications of these radios can be found in Appendix B: "EP10 Specifications".

2.3 Processor

EP10 is built around a Texas Instruments AM3715 800MHz ARM Cortex-A8 processor.



2.4 Identifying Hardware

An overview of the operating system and the installed hardware on EP10 can be viewed by opening the System applet in the Windows Control Panel.

2.5 LEDs

Three LEDs are located on the upper-right side of the EP10, just above the display. When you press the **Power** button, the LED flashes yellow to indicate that the EP10 has been powered up.

Keep in mind that the application running on the EP10 can dictate how the application LED operates. Review the documentation provided with your application to determine LED behaviour.

Table 2.1 Function of EP10 LEDs

LED	Function
Green/Yellow/Red Charge LED (left-most LED)	Charge indicator, when connected to an external power supply. See the table below for descriptions of Charge LED behaviour.
Yellow Application LED (centre LED)	Application LED. The behaviour of this LED is application dependent.
Blue Radio Power LED (right-most LED)	Radio power indicator.

If the EP10 is attached to an external power supply (through a snap module or dock), the charge LED (the left-most LED) reflects the battery charge status.

Table 2.2 EP10 Charge LED Behaviour

Charging Status	LED Colour	LED Flash Rate	Duty Cycle
No external power detected.	Not applicable	OFF	Not applicable
Battery charge complete.	GREEN	Solid ON	Continuous
Battery charging normally.	GREEN	Slow	Regular
Battery not charging because battery temperature is outside the allowable range: 0° C to 40° C, 32° to 104° F.	YELLOW	Normal	Regular
Battery charge failure. Unable to read battery or non Psion battery.	RED	Solid ON	Continuous

2.6 Power Management

EP10 is powered by a lithium-ion rechargeable battery pack and can also be powered from external power. When EP10 is powered from external power, the battery pack also charges.

Use only power sources recommended or sold by Psion for EP10.

2.6.1 Batteries

Two Lithium-Ion battery pack variants are available for the EP10: High Capacity 3600 mAh battery pack, Model Number RV3010 and Standard Capacity 2400 mAh battery pack, Model Number RV3005. For more details on battery safety, charging and usage, refer to the EP10 Hand-Held Computer User Manual (P/N 8000227).

3 SOFTWARE

3.1 Overview

This chapter describes the software aspects of the EP10.

3.2 Drivers

3.2.1 Windows Drivers

The Peripherals Driver

Psion provides the peripherals driver for all expansion and docking peripherals. The peripherals driver is a stream driver activated very early in the boot sequence.

The Serial Port Driver

The full-function UART (Universal Asynchronous Receiver/Transmitter) serial port driver is loaded if required, as determined by the registry settings for any peripherals detected. For details on the registry settings, see Section 3.4.1: "Peripheral Registry Settings".

3.2.2 Non-Psion Drivers

The Psion platform loads standard device drivers. If the peripheral uses standard drivers such as serial or USB, there is no need to load custom drivers.

There must be a registry entry for the driver and its parameters. For more information see Section 3.4: "Registry Keys".

3.3 System Initialization

During system startup on EP10, the following sequence occurs:

1. The device ID is read (if a dock is connected).
2. The USB (OTG or Host) ports/hub are enabled.
3. The device-specific driver (if there is one) is loaded.
4. A dock notification is sent out when the shell is ready.

3.4 Registry Keys

3.4.1 Peripheral Registry Settings

This section describes the registry keys required by the peripherals driver to identify and define the behaviour of peripherals. The parent key for all of the device-specific subkeys is:

```
[HKLM\Drivers\BuiltIn\Peripherals\devices]
```

Within that key, create a subkey (if it does not already exist) for the type of connector that the peripheral will attach to. For the EP10, only the docking connector is available, which is identified with the subkey '*4*'.

For example, the registry keys that describe peripherals connecting to the docking connector would be stored in the subkey:

```
[HKLM\Drivers\BuiltIn\Peripherals\devices\4]
```

Within the connector type subkey create a further subkey using the Device ID reported by the peripheral. For peripherals that attach to the docking connector, an integer value based on a resistor ID in the peripheral is used for identification (see Table 3.3: "Docking Device Identification" for resistor values). For example, the Device Name (resistor ID) for the EP10 single desktop dock is 8, therefore the correct registry key for parameters pertaining to that peripheral is:

```
[HKLM\Drivers\BuiltIn\Peripherals\devices\4\8]
```

Device Registry Values

Within the subkey for the specific peripheral, add the following device registry values:

- **Name** (REG_SZ): A descriptive name for the peripheral.

- **PowerMode** (REG_DWORD): This value determines how and when the peripheral hardware is powered by the peripherals driver. The possible values are *1* (Auto) and *2* (Manual). If the power mode is set to Auto, the peripheral power is managed by the peripherals driver; the peripheral is powered off when the computer enters suspend mode and powered on when the computer resumes activity.

The default setting for this value is *2*, which is the recommended setting. Under this setting, power to the peripheral must be controlled by a loaded device driver or application.

- **Notifications** (REG_DWORD): The notifications registry value determines how the user is notified about peripherals.
  This value is a bit field as defined in the following table:

Table 3.1 Notifications Registry Value Definitions

Bit	Functionality	Description
0 (LSB)	No Notification	No notification is displayed.
1 (MSB)	Notification Enabled	Setting this flag causes a "new device" pop-up to be displayed, containing the name and status of the peripheral. The name reported is the **DeviceNameID** registry value. If that value does not exist, the **Name** registry value is used instead. If that also does not exist, the Device Name from the registry key itself is used.

The default setting for this value is *0*.

- **LoadFlags** (REG_DWORD): The load flags specify the functionality required by the attached peripheral, and therefore the device driver (e.g. USB, UART, etc.) that needs to be loaded to support the peripheral. The LoadFlags value is treated as a bit field, as defined in the following table:

Table 3.2 LoadFlags Registry Value Definitions

Bit	Functionality	Description
0 (LSB)	Reserved	
1	USB Host	This flag indicates a peripheral that requires USB Host functionality. When this bit is set, the USB hub and ports are powered and enabled for the docking connector. This bit must be set for any docking peripheral with a USB Host connector.
2	Reserved	
3	Reserved	
4	USB OTG	This flag is required for docking peripherals with USB On-The-Go functionality.
5 (MSB)	Dock Power Out	The connected peripheral requires power from the battery.

  If this flag is not specified, any custom device drivers required by the peripheral must be specified in the driver registry subkey (see Section 3.4.1.1: "Device Driver Registry Keys").
- **Icon** (REG_DWORD): This is the Resource ID of the icon to be displayed for this peripheral in the status bar. Currently, icons can only be loaded from Psion DLLs.
- **DeviceNameID** (REG_DWORD): This is the Resource ID of the name string to be displayed in the "New Device" window. Currently, the name string can only be loaded from Psion DLLs.

3.4.1.1 Device Driver Registry Keys

If the peripheral requires an additional driver to be loaded, registry keys need to be created to specify the information for the driver. As a rule, docking peripherals do not require additional drivers, nor do many USB peripherals. For peripherals that do require an additional driver to be loaded, follow these steps:

Within the device registry key, add a "driver" subkey. For example:

```
[HKLM\Drivers\BuiltIn\Peripherals\devices\4\1\driver]
```

Under the \driver subkey, add the following standard registry values for drivers:

- **Prefix** (REG_SZ)
- **Dll** (REG_SZ)
- **Index** (REG_DWORD)
- **Flags** (REG_DWORD)
- **IClass** (REG_MULTI_SZ)

For descriptions and details of these values, consult the Microsoft documentation on developing device drivers. Note that the **Order** value is not used here.

The registry keys and values in the \driver subkey are not accessed directly, but are used as a template to create a driver entry in a different registry location. The \driver subkey and all of its entries are copied to the following registry location:

```
[HKLM\Drivers\BuiltIn\Peripherals\devices\active\4\[Device ID]
```

Note: The driver entries are only copied if the driver key is present and contains a **Dll** *registry value.*

The drivers for detected peripherals are loaded from this "active" registry location. The driver is loaded through a call to **ActiveDeviceEx()** after other initialization is finished.

It may also be necessary to copy registry keys from one location to another in the registry before loading a driver. To do this, first create a "RegCopy" subkey. For example:

```
[HKLM\Drivers\BuiltIn\Peripherals\devices\4\1\RegCopy]
```

Within the \RegCopy subkey, add one or more entries in the form of "**source**" = "**dest**", where **source** is the source registry key and **dest** is the destination registry key.

Note: In the rare case that registry information needs to be copied outside HKEY_LOCAL_MACHINE, instead name the subkey "RegCopy_HKCU" (for HKEY_CURRENT_USERS) or "RegCopy_HKCR" (for HKEY_CLASSES_ROOT).

Remember that the backslash '\' characters in the registry key strings will need to be 'escaped' with another backslash character. For example:

```
[HKLM\Drivers\BuiltIn\Peripherals\devices\4\1\RegCopy]
"Drivers\\BuiltIn\\Peripherals\\devices\\4\\1\\RegKeys" = "Software\\Psion\\DeviceDriver"
```

This function copies the specified source key and all subkeys underneath it to the target location.

In rare cases, multiple drivers may need to be loaded to support a single piece of hardware. In these cases, the Windows bus enumerator can be used (see the Microsoft documentation at http://code.msdn.microsoft.com/BusEnum2) . Alternatively, the driver specified in the driver key can load the other drivers.

3.4.2 Software Registry Entries

If the peripheral uses custom software, the version information for the software can be added to the System Properties of the System Control Panel applet.

Using the registry functions, create the following registry key (where <name> is the name of the software component as it will appear in the System Properties):

```
[HKLM\Software\Psion\SystemProperties\Software\<name>]
```

Beneath that key, set the following registry values:

- @ (REG_SZ): Default value. Set to "Components" to make the software information appear in the Components list of the System Properties.
- **Value** (REG_SZ): Enter the version of the software component here.

For example:

```
; Registry entry for a software program named Scanner Program, version 1.5.21
;
[HKLM\Software\Psion\SystemProperties\Software\Scanner Program]
      "@"="Components"
      "Value"="1.5.21"
```

This example creates an entry in the Components list of the System Properties tab of the System Control Panel applet, which reads "Scanner Program: 1.5.21".

3.5 Peripheral Detection and Driver Loading Sequence

When a peripheral is attached to the docking connector, the following steps are performed to detect and identify the connected hardware and load the appropriate drivers:

1. The device ID is detected.
2. The registry is searched for a matching device ID. If a matching entry is not found, the detect operation terminates.
3. If a matching device entry is found, the registry entry for the driver (if any) is copied to the **active** registry key.
4. If one or more **RegCopy** entries are found, the source keys are copied to the destination key locations.
5. Power is enabled to the connector.
6. If USB functionality is specified, the USB (OTG or Host) ports/hub are enabled.
7. The device-specific driver (if there is one) is loaded.

The peripheral attached to the docking connector is identified to the EP10 by means of a resistor. The value of the resistor provides a Device ID number, and indicates which functionalities of the EP10 must be enabled for that peripheral, according to the following table:

Table 3.3 Docking Device Identification

Device ID	Resistor	Peripheral	USB OTG	USB Host	Power
0	1 MΩ	Open circuit; nothing attached			
1	150 KΩ	Reserved			
2	59 KΩ	RV4002 DB9 RS-232 snap module	ON	OFF	OFF
3	34.8 KΩ	RV4001 USB snap module	ON	OFF	OFF
4	**23.2 KΩ**	**User defined (for use with HDK)**[1]			
5	16.2 KΩ	Vehicle cradle	ON	ON	ON
6	**11.8 KΩ**	**User defined (for use with HDK)**[1]			
7	8.66 KΩ	Quad dock	ON	OFF	OFF
8	6.34 KΩ	Single dock	ON	OFF	OFF
9	4.53 KΩ	Single dock with expansion (reserved)	ON	ON	ON
10	3.01 KΩ	Reserved	ON	ON	ON
11	1.82 KΩ	Reserved			
12	825Ω	Reserved			
13	0 Ω	Short circuit			

[1] These IDs are available for 3rd party peripherals, but may be used by Psion for other devices in the future.

3.6 Serial (COM) Port Assignments

The default serial port assignments for the EP10 are shown in the following table. Ports not listed are unassigned.

Table 3.4 Default EP10 Serial (COM) Port Assignment

Serial Port	Default Assignment	Comments
COM0:	ActiveSync	ActiveSync Port - Reserved.
COM2:	GPS	This COM port is opened by applications that require GPS data. This COM port may instead be opened by the GPS intermediate driver.
COM5:	External USB-serial adaptor	External USB-to-serial adaptor WA4015 can be plugged into microA/B USB port on RV4001 snap module.
COM6:	USB port replicator	RS-232 port on RV4002 snap-on module. RS-232 port on vehicle cradle.
COM7:		Reserved.
COM9:	WWAN virtual serial port	WAN COM port.
COM18	WWAN hardware (private)	Reserved for internal use.
COM19	GPS hardware (private)	Reserved for internal use.
COM20	*Bluetooth* hardware (private)	Reserved for internal use.
COM24	GPS power (private)	Reserved for internal use.

Note: 1. The proper name for COM ports above COM9 is \$device\COMxx (no ":" following the COM port number).

2. COM ports cannot be reassigned on the EP10.

3. ***Bluetooth*** *creates and destroys many virtual ports.*

3.7 EP10 HDK Application Development Software

To develop software applications for the EP10 and its peripherals using the Mobile Devices SDK, you must install the following software packages on your development system. All packages are available on the Psion Community website (http://community.psion.com), in the **Downloads** section (free registration is required for downloading).

3.7.1 Psion Mobile Devices SDK

The Mobile Devices SDK contains many APIs designed specifically for interacting with Psion mobile devices and peripherals. Very simple and generic applications may not require these APIs, so it may not be necessary to install this package, but it is recommended.

This package is located in the **Mobile Devices SDK** subfolder of the Community website **Downloads** section as "MDSDK [version] - Installer" (the current version at the time of this publication is 5.4). Download and execute the setup program, and follow the onscreen instructions to install the package.

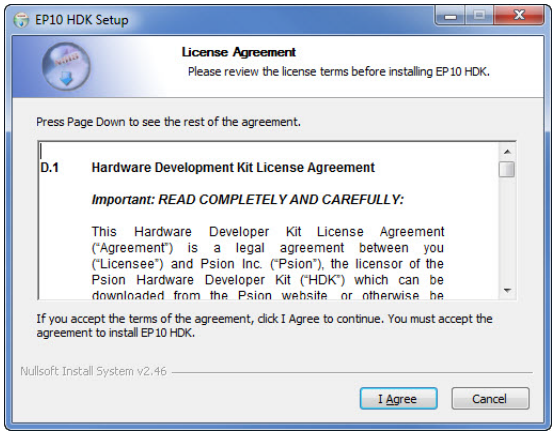
3.7.2 EP10 HDK Development Files

The EP10 HDK files provide an API library of C functions to interact with custom-built hardware connected to the EP10 docking ports, as well as an HDK Demo application program.

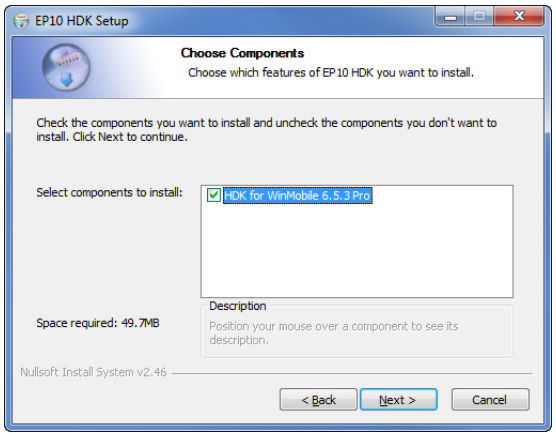
The installation program for these files is included in the EP10 HDK package. See Section 1.6: "Obtaining the HDK" for instructions on how to download this package to your computer.

Follow these instructions to install the EP10 HDK API library and HDK Demo application files:

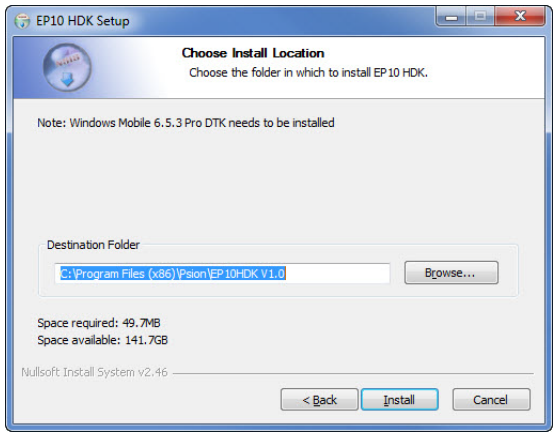
1. Navigate to the folder with the HDK files, and double-click on the file *EP10HDK_Setup.exe* to begin the installation.
   The License Agreement *dialog box appears:*



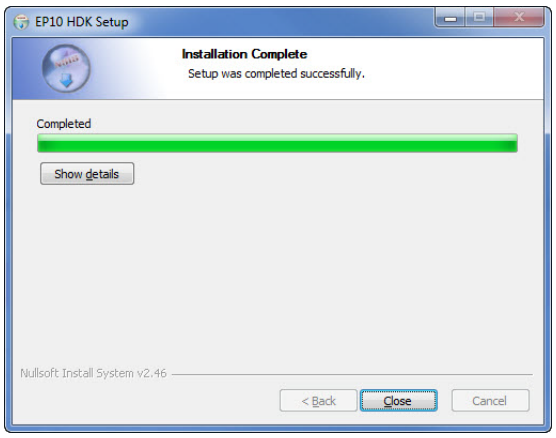
2. Use the scroll bar or press the **Page Down** key to read through the entire license agreement, then click the **I Agree** button to proceed.
   The Choose Components *dialog box appears:*



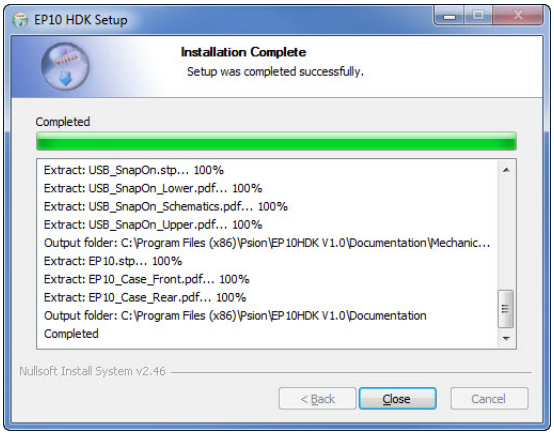
3. Select the destination platform(s) you will be developing the applications for. EP10 only supports the Microsoft Windows Embedded 6.5 operating system, but future EP10 HDK releases may have additional options. Ensure there is a check mark in the box next to *HDK for WinMobile 6.5.3 Pro*, then click **Next >**.
   The Choose Install Location *dialog box appears:*



4. To change the default installation folder, type the path into the field, or click the **Browse** button and navigate to the destination folder. Click **Install** to proceed.
The progress dialog box appears as the installer extracts and copies the files to the destination folders.



5. If you wish to see a breakdown of the installation progress, click the **Show details** button.
The details window appears. Click and drag the scroll bar on the right to scroll the information up or down.



6. Click **Close** to end the installation.

3.7.3 EP10 HDK API Functions

The following sections describe the C functions declared in the file Hdk7515.h.

Note: HDK functions cannot be called from the xxx_Init method of a driver loaded by the peripherals driver.

3.7.3.1 Hdk7515_Open

Syntax

DWORD Hdk7515_Open(HANDLE *hdk, Hdk7515_Connector connector);

Parameters

- hdk – [out] pointer to a HANDLE. If the open call succeeds, the handle is changed to a valid handle value that can be used in other HDK operations.
- connector – [in] one of the values in the Hdk7515_Connector enumeration identifying the expansion slot (or other connector) being controlled.

Description

This function is used to open a handle to the Psion HDK. The handle opened can then be used in other HDK functions. The handle must be closed using Hdk7515_Close(). This parameter must not be null. Each handle is tied to a single particular expansion slot or connector.

The expansion slot or other connector being controlled is determined by the 'connector' parameter.

Returns

- ERROR_SUCCESS – if successful. The handle pointed to by 'hdk' is now valid.
- ERROR_INVALID_PARAMETER – the 'hdk' pointer is null, or the specified connector is invalid.
- ERROR_INVALID_DATA – an exception was generated.
- ERROR_NOT_SUPPORTED – this peripheral is not supported by the HDK.
- Other errors are possible.

Sample Code

```
DWORD OpenAndCloseHdk( )
{
    HANDLE hdkHandle = INVALID_HANDLE_VALUE;

    DWORD result = Hdk7515_Open(&hdkHandle, Hdk7515_Connector_Docking);
    if( result != ERROR_SUCCESS ) {
        return ERROR_NOT_SUPPORTED;
    }

    // ...

    Hdk7515_Close(hdkHandle);
    hdkHandle = INVALID_HANDLE_VALUE;

    return ERROR_SUCCESS;
}
```

3.7.3.2 Hdk7515_Close

Syntax

DWORD Hdk7515_Close(HANDLE hdk);

Parameters

- hdk – [in] a valid open HDK handle.

Description

This function is used to close an open HDK handle and release all the resources it owns. The handle cannot be used after it is closed.

Returns

- ERROR_SUCCESS – if successful. The handle is now closed.
- ERROR_INVALID_HANDLE – the specified handle is invalid or null.
- ERROR_INVALID_DATA - an exception was generated.
- Other errors are possible.

Sample Code

See sample code for Section 3.7.3.1: "Hdk7515_Open".

3.7.3.3 Hdk7515_SetPower

Syntax

DWORD Hdk7515_SetPower(HANDLE hdk, BOOL enable);

Parameters

- hdk – [in] an open HDK handle.
- enable – [in] the new power state of the connector being controlled (see Section 3.7.3.1: "Hdk7515_Open").

Description

Powers on/off the connector being controlled.

The power state is reference-counted. If this function is called multiple times with the 'enable' parameter set to TRUE, it has to be called the same number of times with the 'enable' parameter set to FALSE in order to power the connector off.

The default power state for connectors is off.

Returns

- ERROR_SUCCESS – if successful.
- ERROR_INVALID_HANDLE – the specified handle is invalid.
- ERROR_INVALID_DATA - an exception was generated.
- Other errors are possible.

Sample Code

```
DWORD SetPower(BOOL powerState)
{
    HANDLE hdkHandle = INVALID_HANDLE_VALUE;

    DWORD result = Hdk7515_Open(&hdkHandle, Hdk7515_Connector_Docking);
    if( result != ERROR_SUCCESS ) {
        return ERROR_NOT_SUPPORTED;
    }

    result = Hdk7515_SetPower(hdkHandle, powerState);

    Hdk7515_Close(hdkHandle);
    hdkHandle = INVALID_HANDLE_VALUE;

    return result;
}
```

3.7.3.4 Hdk7515_GetPower

Syntax

DWORD Hdk7515_GetPower(HANDLE hdk, BOOL *enabled);

Parameters

- hdk – [in] an open HDK handle.
- enabled – [out] pointer to a BOOL containing the current connector power state.

Description

This function is used to determine the current power state of a connector.

The default power state for connectors is off.

Returns

- ERROR_SUCCESS – if successful.
- ERROR_INVALID_HANDLE – the specified handle is invalid.
- ERROR_INVALID_PARAMETER – one of the parameters is incorrect or invalid.
- ERROR_INVALID_DATA - an exception was generated.
- Other errors are possible.

Sample Code

```
DWORD GetPower(BOOL *powerState)
{
    HANDLE hdkHandle = INVALID_HANDLE_VALUE;

    DWORD result = Hdk7515_Open(&hdkHandle, Hdk7515_Connector_Docking);
    if( result != ERROR_SUCCESS ) {
        return ERROR_NOT_SUPPORTED;
    }

    BOOL powerEnabled = FALSE;
    result = Hdk7515_GetPower(hdkHandle, &powerEnabled);
    if( result == ERROR_SUCCESS ) {
        *powerState = powerEnabled;
    }

    Hdk7515_Close(hdkHandle);
    hdkHandle = INVALID_HANDLE_VALUE;

    return result;
}
```

3.7.3.5 Hdk7515_SetPowerMode

Syntax

DWORD Hdk7515_SetPowerMode(HANDLE hdk, Hdk7515_PowerMode mode);

Parameters

- hdk – [in] an open HDK handle.
- mode – [in] the new power mode for the peripheral.

Description

This function is used to configure the power mode for the peripheral attached to the connector. There are currently two modes available: Auto and Manual.

If the power mode of the peripheral is Manual, the connector power will not be controlled by the Peripherals Driver. A loaded device driver/application must enable and disable the power.

If the power mode of the peripheral is Auto, the Peripherals driver will enable/disable power to the connectors automatically. Power to the connector is:

1. Applied initially before the device driver for the connected hardware is loaded.
2. Removed when the hand-held is suspended.
3. Reapplied when the hand-held resumes from suspend.

The default power mode is Manual.

Returns

- ERROR_SUCCESS – if successful.
- ERROR_INVALID_HANDLE – the specified handle is invalid.
- ERROR_INVALID_PARAMETER – one of the parameters is incorrect or invalid.
- ERROR_INVALID_DATA - an exception was generated.
- Other errors are possible.

Sample Code

```
DWORD SetPowerMode(Hdk7515_PowerMode powerMode)
{
    HANDLE hdkHandle = INVALID_HANDLE_VALUE;

    DWORD result = Hdk7515_Open(&hdkHandle, Hdk7515_Connector_Docking);
    if( result != ERROR_SUCCESS ) {
        return ERROR_NOT_SUPPORTED;
    }

    Hdk7515_PowerMode mode = Hdk7515_PowerMode_Manual;
    result = Hdk7515_GetPowerMode(hdkHandle, &mode);
    if( result != ERROR_SUCCESS ) {
        Hdk7515_Close(hdkHandle);
        hdkHandle = INVALID_HANDLE_VALUE;
        return result;
    }

    if( mode != powerMode ) {
        result = Hdk7515_SetPowerMode(hdkHandle, powerMode);
    }

    Hdk7515_Close(hdkHandle);
    hdkHandle = INVALID_HANDLE_VALUE;

    return result;
}
```

3.7.3.6 Hdk7515_GetPowerMode

Syntax

DWORD Hdk7515_GetPowerMode(HANDLE hdk, Hdk7515_PowerMode *mode);

Parameters

- hdk – [in] an open HDK handle.
- mode – [out] pointer to a Hdk7515_PowerMode value that will contain the current power mode of the connector.

Description

This function is used to retrieve the current power mode of the peripheral attached to the connector. There are currently two modes available: Auto and Manual.

The default power mode is Manual.

This function can only be called by a driver, not by an application. The driver that calls this function must be loaded by the Peripherals driver at startup.

Returns

- ERROR_SUCCESS – if successful.
- ERROR_INVALID_HANDLE – the specified handle is invalid.
- ERROR_INVALID_PARAMETER – one of the parameters is incorrect or invalid.
- ERROR_INVALID_DATA - an exception was generated.
- Other errors are possible.

Sample Code

```
DWORD GetPowerMode(Hdk7515_PowerMode *powerMode)
{
    HANDLE hdkHandle = INVALID_HANDLE_VALUE;

    DWORD result = Hdk7515_Open(&hdkHandle, Hdk7515_Connector_Docking);
    if( result != ERROR_SUCCESS ) {
        return ERROR_NOT_SUPPORTED;
    }

    Hdk7515_PowerMode mode = Hdk7515_PowerMode_Manual;
    result = Hdk7515_GetPowerMode(hdkHandle, &mode);
    if( result == ERROR_SUCCESS ) {
        *powerMode = mode;
    }

    Hdk7515_Close(hdkHandle);
    hdkHandle = INVALID_HANDLE_VALUE;

    return result;
}
```

3.7.4 API Enumerations

The following enumerations are declared in the file Hdk7515Consts.h:

3.7.4.1 Hdk7515_PowerMode

The Hdk7515_PowerMode enumeration is defined as follows:

```
typedef enum {
        Hdk7515_PowerMode_Auto = 1,
        Hdk7515_PowerMode_Manual = 2,
        Hdk7515_PowerMode_Invalid = 0xffffffff
} Hdk7515_PowerMode;
```

3.7.4.2 Hdk7515_Connector

The Hdk7515_Connector enumeration is defined as follows:

```
typedef enum {
        Hdk7515_Connector_Docking = 6,
        Hdk7515_Connector_Invalid = 0xffffffff
} Hdk7515_Connector;
```

3.8 EP10 HDK Demo Application

Bundled with the EP10 HDK is a demo application that can be used to test the basic functionality of an expansion peripheral. The files for this application (including the source code) can be located in the **..\DemoApp** subfolder of where you installed the HDK files.

To run the HDK demo application, copy the *7515HDK.dll* and *EP10HDKDemo.exe* files to the file system on your EP10 hand-held computer. The .dll file must be located in the same folder as the executable file, or in the system folder.

Double-tap on the executable file on the EP10 to launch the demo application. The application will run through a sequence of function calls and report the results in status windows on the EP10 display.

- Check power mode (Auto/Manual), and set to *Manual* if not already set. Report result.
- Report current power state (enabled/disabled).
- Toggle the power state, and report.
- Restore the power state to original value, and report.

Tap **OK** to proceed through the report messages, and cycle through to the end of the application.

4 MECHANICAL CONSIDERATIONS

4.1 Overview

This chapter describes the physical aspects of manufacturing and mounting peripherals to the base of the EP10.

4.2 Materials

The EP10 snap-modules manufactured by Psion are manufactured using ABS + PC CX7240, and the texturing is VDI27. We recommend using a similar material for your peripherals.

4.3 HDK Mechanical Files

The Hardware Development Kit provides the following mechanical models and drawings:

4.3.1 3D Files

STEP files provide 3D models of the EP10 and snap modules for viewing with CAD software. These models give the exact forms and dimensions of the components so that peripherals can be designed to fit the EP10 precisely.

Table 4.1 3D Files

Description	Filename
3D step file of the EP10 housing	EP10.stp
3D step file of the EP10 DE9 RS-232 snap module	Serial_SnapOn.stp
3D step file of the EP10 USB snap module	USB_SnapOn.stp

4.3.2 2D Files

PDF files provide 2D drawings of the surfaces and attachment points of the EP10 and snap modules. The drawings show the exact locations and relative positions of screw mountings, etc.

Table 4.2 2D Files

Description	Filename
2D pdf drawing of the EP10 front casing	EP10_Case_Front.pdf
2D pdf drawing of the EP10 rear casing	EP10_Case_Rear.pdf
2D pdf drawing of the EP10 DE9 RS-232 snap module lower casing	Serial_SnapOn_Lower.pdf
2D pdf drawing of the EP10 DE9 RS-232 snap module upper casing	Serial_SnapOn_Upper.pdf
2D pdf drawing of the left latch for an EP10 snap module	Snap_On_Latch_Left.pdf
2D pdf drawing of the right latch for an EP10 snap module	Snap_On_Latch_Right.pdf
2D pdf drawing of the EP10 USB snap module lower casing	USB_SnapOn_Lower.pdf
2D pdf drawing of the EP10 USB snap module upper casing	USB_SnapOn_Upper.pdf

4.4 Peripheral Design

4.4.1 Physical Design Considerations

Custom EP10 peripherals connect through the docking connector on the base of the unit. Whether this peripheral uses a "snap module"-type design that attaches to the unit and travels with it, or a "desktop dock"-type design, in which the EP10 will remain at rest, there are a few important points to bear in mind when designing your peripheral.

There are no threaded inserts for screws in the EP10 to secure the peripheral. However, there is a small cavity on both sides of the EP10 for spring-mounted catches to latch on to. Your peripheral should include

catches which fit in these cavities and hold the peripheral securely to the unit, but are also easily released by the user. The EP10 HDK includes drawings and schematics of the left and right latches from the Psion snap modules, for reference in designing these catches.

When designing your peripheral consider whether the user will need full access to the keyboard, microphone, hand-strap latch, or the battery compartment while the peripheral is attached, and make sure these areas are not covered.

There are small alignment holes on either side of the docking connector designed to accommodate studs on the peripheral. This helps align the electrical contacts on the peripheral precisely with the contacts of the EP10 docking connector, and to keep them from shifting during use. it is highly recommended that the design of your peripheral includes these alignment studs.

4.4.2 USB-Serial Configuration

The C8051 microprocessor chip used with the Psion USB-serial firmware is capable of reporting different configurations to the Psion hand-held computer. The configuration is dependant on the voltages present on some of the C8051 GPIO pins at initialization time. See the table below for configurations supported by EP10.

P0.0	P0.1	P0.6	P0.7	Comments
•	1	•	•	*Standard USB serial adaptor (COM5)*
1	0	1	1	*USB-Serial "Port 1" (COM6)*
0	0	1	1	*USB-Serial "Port 2" (requires additional registry keys for support)*
				All other combinations reserved for Psion use.

0 = pulled low ***1 = pulled high*** ***• = high or low***

The assignments are as shown to avoid conflicts when plugging in a standard USB-serial adaptor into a vehicle cradle or desktop dock. Thus you can have two serial ports on these devices and they will not conflict with each other.

5 CONNECTIONS

5.1 Overview

This chapter describes the details of the EP10 docking connector, and the connectors of the snap modules available for the EP10.

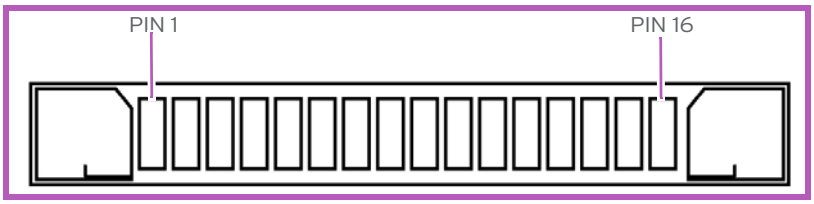
5.2 Docking Connector

The 16-pin docking connector on the EP10 main logic board provides power connectivity in both directions (to power/charge the EP10 *from* the peripheral, or to use the EP10 to provide power *to* a peripheral), as well as USB connectivity. For serial connectivity, a USB-to-serial component must be included in the peripheral (such as in the RV4002 snap module).

Connector Details

- Manufacturer: Molex
- Manufacturer Part No.: Handylink 44828 SMT
- Mating Connectors: Handylink 45339, 45593, 45560
- Number of Pins: 16
- Current Rating: 1.0 A per pin

Figure 5.1 Diagram of EP10 Docking Connector Pins



EP10 Docking Connector **Pinout**

Pin	Function	I/O Type	Notes
1	Ground	Ground	
2	DC power	Input	3 A maximum
3	DC power	Input	3 A maximum
4	DC power	Input	3 A maximum
5	Power out (battery)	Output	1 A maximum
6	USB Host D+	I/O	Full speed 2.0
7	USB Host D-	I/O	Full speed 2.0
8	USB OTG VBUS	Output	5 V power in (1.5 A); Power out (500 mA)
9	Dock ID	I/O	See Table 3.3: "Docking Device Identification"
10	USB OTG D-	I/O	High speed 2.0
11	USB OTG D+	I/O	High speed 2.0
12	USB OTG ID	Input	OTG ID
13	Ground	Ground	
14	Reserved	N/A	Reserved
15	Reserved	N/A	Reserved
16	Ground	Ground	

5.3 Snap Module Connectors

There are two single-unit desktop docking stations available for EP10: models RV4001 and RV4002.

The USB & Charger Snap Module (RV4001) allows you to connect a micro-USB cable and a power cable to the EP10.

The DE9 RS-232 & Charger Snap Module (RV4002) provides an RS-232 connection and a power connection to the EP10.

5.3.1 RV4001 Snap Module USB Connector

The RV4001 snap module provides one standard microAB USB 2.0 receptacle, and one 5 V DC power jack for charging from a standard vehicle power adaptor or an AC wall adaptor.

USB 2.0 microAB Interface

The USB microAB receptacle on the snap module allows the EP10 to connect to a USB host or client device. It supports low speed (1.5 Mbps), full speed (12 Mbps) and high speed (480 Mbps) communications.

Figure 5.2 USB MicroAB Receptacle

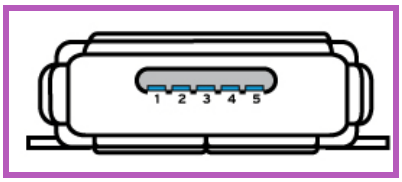


Table 5.1 Pinout Of The USB MicroAB Connector

Pin	Name	Description	Direction
1	VBUS	DC current from external host	Input from connected peripheral.
2	USB_D-	USB Client D-	Bidirectional (half-duplex).
3	USB_D+	USB Client D+	
4	ID	ID connected plug (Only microB plug is supported in the desktop docking stations.)	
5	Ground		

5.3.2 RV4002 Snap Module RS-232 DB9

The RV4002 desktop docking station provides a male DB9 port for connecting serial peripherals, and a 5 V DC power jack for charging from a standard vehicle power adaptor or an AC wall adaptor.

RS-232 DB9M Interface

The 9-pin male RS-232 receptacle on the snap module connects to a stadard serial cable with a 9-pin female connector. The port is capable of communicating at speeds from 300 kbps up to 460800 kbps.

Figure 5.3 RS-232 DB9M Receptacle

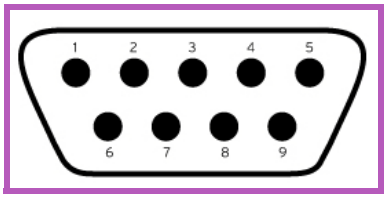


Table 5.2 Pinout Of The RS-232 DB9M Connector

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RXD	Received Data
3	TXD	Transmitted Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator

A APPENDIX: RESOURCES

Most of the following resources are available on the Psion Community website, located at (http://community.psion.com).

Website registration is required to log in to the site and obtain the materials.

A.1 Psion User Manuals

The following user manuals are available on the Psion Community website, under **Knowledge > Knowledge Base > Product Manuals**:

- Psion, 2011, *EP10 Hand-Held Computer (Windows Embedded 6.5) User Manual* (Part number 8000227)
- Psion, 2009, *Mobile Devices SDK Developers Guide* (Part number 8100016)

A.2 Psion Downloadable Software

The following software is available on the Psion Community website, under **Downloads > Firmware/Software & Demos > Software Demos, Tools & Drivers**:

- Psion USB setup utility

The following software is available on the Psion Community website, under **Downloads > Developer (SDK/HDK)**:

- EP10 HDK (click on Psion HDK)
- Mobile Devices SDK

A.3 Psion Accessory And Parts Information

For more information on accessories and parts for the EP10, visit http://www.psion.com/products.

B APPENDIX: EP10 SPECIFICATIONS

B.1 EP10 Specifications - Model No. 7515

Note: Performance specifications are nominal and subject to change without notice.

B.1.1 Hardware

Physical Dimensions

- Device: 6.2" x 3.1" x 1.2" (158 mm x 78 mm x 30.6 mm)

Weight (with battery pack)

- Weight with 2400 mA battery: 0.8 lb (336 g)

User Interface

- Display (Backlit)
  - 3.7 in. VGA portrait mode
  - Backlight feature 165 cd/m2 output
  - Sunlight readable with integrated touchscreen
  - Colour 480 x 640 graphic TFT
  - Passive stylus or finger operation
- Audio
  - Built-in 85db mono speaker
  - microphone
  - receiver
- Keyboard (Backlit)
  - Numeric, QWERTY or AZERTY
  - High reliability keypad ultra-white backlight
  - Ergonomically enhanced for ambidextrous one-hand operation
- Camera
  - 3.2 Mega Pixel Colour
  - Auto Focus
  - Dual LED Flash
  - Video capture capability

B.1.2 Software

Platform

- AM3715 Processor
- 800 MHz (ARM Cortex A8)
- On-board RAM: 256 MB SDRAM
- On-board ROM: 2 GB Flash

Operating System

- Microsoft Windows Embedded 6.5

Programming Environment

- HTML, XML
- Mobile Devices SDK
- JavaTM
- Visual Studio® 2008
- Standard protocol APIs - Windows® sockets

Application Software

- Internet Explorer® Mobile included with Windows® Mobile® 6
- Wordpad
- ActiveSync
- Mobile Control Center (MCC) device management

B.1.3 Wireless Communication

Note: 802.11ab/g/n and **Bluetooth** *are available simultaneously.*

- On-board IEEE 802.11a/b/g/n
- Bluetooth v2.1 radio (CCX V4 Certified
  - UMTS 3.5G HSPA radio options (TBD)
  - Integrated 5 band Antenna, supports both voice and data
  - SiRF starIV GPS

B.1.4 Power Management

- Optional 3.7 V @ 2400 mAh or High Cap 3600 mAh Li-ion rechargeable batteries
- Full Shift operation
- SMART battery
- System backup (5 minutes) during battery swap

B.1.5 Expansion Slot

- One microSD slot

B.1.6 Bar Code Scanner

Note: User upgradeable.

- 2D EA11 imager

B.1.7 Digital Camera

- 3.2 mega pixel colour
- Auto Focus
- Dual LED Flash
- Video capture capability

B.1.8 Voice Over IP (VOIP)

- Push-to-talk

B.1.9 Accessories

For details about accessories available with the EP10, refer to the EP10 Hand-Held Computer User Manual.

- **Carrying Accessories:**
  - Hand strap
  - Carrying case
- **Communications:**
  - Quad dock (4-site) with 10/100 BaseT Ethernet and charge functions.
  - Desktop dock with Type A and Type B USB connectivity and charge functions for an internal battery along with a spare battery.

- **Power supplies:**
  - AC wall adaptor
  - Vehicle power outlet adaptor
  - Quad charger (4-site)
  - Snap Module: USB DE9M powered serial plus Charger
  - Snap Module: USB Host/Client plus Power/Charger
- **Vehicle peripherals:**
  - Powered and Non-powered cradle
  - RAM Mount with screws

B.1.10 Approvals

- FCC Parts 15B, 15C, 15E, 22H, 24E, 27
- IC RSS-210, RSS-132, RSS-133
- EN 300 328, EN 301 489, EN 55022, EN55024, EN301 511, EN301 908, EN300 440, EN301 893
- Safety IEC/EN 60950-1
- Laser Safety IEC 60825-1

B.1.11 Environmental Specifications

- Operating Temperature: 14ºF to 122 ºFC (-10ºC to +50ºC)
- Storage Temperature: -4ºF to 140ºF (-20ºC to +65ºC)
- Relative Humidity: 5% to 95% RH non-condensing
- Rain & Dust Protection: IP54, IEC 529
- Drop: 5 ft (1.5 m) - 26 drops to polished concrete
- Tumble: 250 times at 0.5 m
- ESD: +/- 15k VDC air discharge, +/- 8k VDC contacts

B.2 Radio Specifications

B.2.1 Murata 802.11 a/b/g/n Direct Sequence Spread Spectrum Radio

Parameter	Sub-parameters	Specifications
Form Factor		Embedded surface mount module, 11.4 x 9.4 mm * This is a combo module containing both Wi-Fi 802.11a/b/g/n and Bluetooth V2.1+EDR radio
Antenna Port	802.11b/g/n	U.FL jack. Non-diversity. Multiplexed between 802.11b/g/n (2.4GHz) and Bluetooth radio
	802.11a/n	U.FL jack. Non-diversity.
Antenna Type	802.11b/g/n	PIFA antenna. Covers 2400-2484 MHz @ <2.0:1 VSWR
	802.11a/n	PIFA antenna. Covers 5150-5860 MHz @ <2.0:1 VSWR
Antenna Gain	802.11b/g/n	3.73 dBi
	802.11a/n	4.85 dBi
Transmit Power	802.11b	+18 dBm typical
	802.11g	+13 dBm typical
	802.11a	+12 dBm typical
	802.11n (2.4 GHz)	+12 dBm typical
	802.11n (5 GHz)	+12 dBm typical

Parameter	Sub-parameters	Specifications
Frequency Range	802.11b/g/n	2400-2484 MHz
	802.11a/n	5150-5350 MHz, 5480-5720 MHz and 5725-5845 MHz
RX Sensitivity	802.11b	-78 dBm @ 11 Mbps
	802.11g	-67 dBm @ 54 Mbps
	802.11a	-67 dBm @ 54 Mbps
	802.11n (2.4 GHz)	-66 dBm @ 65 Mbps
	802.11n (5 GHz	-66 dBm @ 65 Mbps
Data Rates	802.11b	1,2,5.5,11 Mbps
	802.11a/g	6,9,12,18,24,36,48,54 Mbps
	802.11n	6.5,13,19.5,26,39,52,58.5,65 Mbps
EVM	802.11b	32% max
	802.11g	-26 dB max
	802.11a	-26 dB max
	802.11n (2.4 GHz)	-29 dB max
	802.11n (5 GHz	-29 dB max
Bluetooth Coexistence		TI Wilink6 proprietary WiFi-BT co-existent scheme.

B.2.2 Murata *Bluetooth* Radio

Parameter	Specifications
Form Factor	Embedded surface mount module, 11.4 x 9.4 mm * This is a combo module containing both Wi-Fi 802.11a/b/g/n and *Bluetooth* V2.1+EDR radio
Antenna Port	U.FL jack (shared with Wi-Fi 802.11b/g/n radio)
Antenna Type	PIFA antenna. Covers 2400-2484 MHz @ <2.0:1 VSWR
Antenna Gain	3.73 dBi
Transmit Power	6.5 dBm typical
Frequency Range	2.400-2.4835 GHz
Channel	79
RX Sensitivity	-90 dBm typical, -70 dBm max
Data Rates	-90 dBm typical, -70 dBm max
802.11 Coexistence	TI Wilink6 proprietary WiFi-BT co-existent scheme.

B.2.3 Sierra Wireless MC5728V

Features	Specifications
Physical	• Small PCI-Express Mini Card standards-based form factor. Adheres to Rev 1.2 of the PCI Express Mini Card Specification • Two U.FL RF connector jacks
Electrical	The MC5728V Mini Card is self-shielded; no additional shielding is required.
Environmental	Temperature operating range: • IS-98D compliance: -30 to +60° C • Reduced RF performance: +60 to +75° C
RF	• Dual-band support for both the 800 MHz cellular and 1.9 GHz PCS bands • Receive diversity support for the 800 MHz cellular and 1.9 GHz PCS bands • Adheres to CDMA authentication as specified in CDMA 1X • Support for IS-95A/B and CDMA 1X Release 0/A • Support for IS-856 1xEV-DO Revision A *Support for gpsOne™ and stand-alone GPS*
Application Interface	• USB supporting multiple logical channels over the USB MUX protocol • USB selective suspend supported for maximum power savings • Wakeup Enable-the modem can be set to wake the host device upon ring, restoration of radio coverage, and/or receipt of SMS • AT command interface
Voice	The MC5728V Mini Card has internal IS-127 and IS-733 vocoders and supports: • Call origination • Silent retry call origination protocol • Echo cancellation • E911 • Incoming call notification
Packet Mode	• IS-2000 data rates up to 1531 kbps, simultaneous forward and reverse channel • IS-856 (1xEV-DO Rev. A) data rates up to 3.1 Mbps forward channel and 1.8 Mbps reverse channel
IS-95 circuit-switched	• V.34 data rates to 14.4 kbps • Quick Net Connect (QNC) support
Short Message Service (SMS)	• Send and receive • Notification of new messages

B.2.4 Cinterion PH8 GSM/GPRS/EDGE/UMTS Radio

Feature	Specifications
General	
Frequency bands	GSM/GPRS/EDGE: Quad band, 850/900/1800/1900MHz UMTS/HSPA+: Five band, 800/850/AWS/1900/2100MHz
GSM class	Small MS
Output power (according to Release 99)	Class 4 (+33dBm ±2dB) for EGSM850 Class 4 (+33dBm ±2dB) for EGSM900 Class 1 (+30dBm ±2dB) for GSM1800 Class 1 (+30dBm ±2dB) for GSM1900 Class E2 (+27dBm ± 3dB) for GSM 850 8-PSK Class E2 (+27dBm ± 3dB) for GSM 900 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1800 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1900 8-PSK Class 3 (+24dBm +1/-3dB) for UMTS 2100, WCDMA FDD Bd I Class 3 (+24dBm +1/-3dB) for UMTS 1900,WCDMA FDD Bd II Class 3 (+24dBm +1/-3dB) for UMTS AWS, WCDMA FDD Bd IV Class 3 (+24dBm +1/-3dB) for UMTS 850, WCDMA FDD Bd V Class 3 (+24dBm +1/-3dB) for UMTS 800, WCDMA FDD Bd VI

Feature	Specifications
Operating Temperature (board temperature)	Normal operation: -30°C to +85°C Restricted operation: -40°C to +95°C
Physical	Dimensions: 33.9mm x 50mm x 3.1mm Weight: approx. 9.5g
RoHS	All hardware components fully compliant with EU RoHS Directive
HSPA features	
3GPP Release 6, 7	DL 14.4Mbps, UL 5.7Mbps UE CAT. [1-6], 11, 12 supported Compressed mode (CM) supported according to 3GPP TS25.212
UMTS features	
3GPP Release 4	PS data rate - 384 kbps DL / 384 kbps UL CS data rate - 64 kbps DL / 64 kbps UL
GSM/GPRS/EGPRS features	
Data transfer	GPRS: • Multislot Class 12 • Full PBCCH support • Mobile Station Class B • Coding Scheme 1 - 4 EGPRS: • Multislot Class 12 • EDGE E2 power class for 8 PSK • Downlink coding schemes - CS 1-4, MCS 1-9 • Uplink coding schemes - CS 1-4, MCS 1-9 • SRB loopback and test mode B • 8-bit, 11-bit RACH • PBCCH support • 1 phase/2 phase access procedures • Link adaptation and IR • NACC, extended UL TBF • Mobile Station Class B CSD: • V.110, RLP, non-transparent • 14.4kbps • USSD
SMS	Point-to-point MT and MO Cell broadcast
GPS features	
Protocol	NMEA
Modes	Standalone GPS, Assisted GPS (control plane AGPS, E911 / user plane AGPS, gpsOneXTRA™)
General	Power saving modes GPS tracking in parallel to 2G/3G diversity operation
Software	
AT commands	Hayes, 3GPP TS 27.007 and 27.005, and proprietary Cinterion Wireless Modules commands
SIM application toolkit	SAT Release 99
Audio	Audio speech codecs GSM: AMR, EFR, FR, HR 3GPP: AMR Speakerphone operation, echo cancellation, noise suppression
Firmware update	Generic update from host application over ASC0 or USB
Interfaces	
Module interface	80-pin board-to-board connector
Antenna	50Ohms. Main GSM/UMTS antenna, UMTS diversity antenna, GPS antenna (active/passive)

Feature	Specifications
USB	USB 2.0 High Speed (480Mbit/s) device interface
Serial interface	ASC0: • 8-wire modem interface with status and control lines, unbalanced, asynchronous • Adjustable baud rates from 9,600bps up to 921,600bps • Supports RTS0/CTS0 hardware flow control • Multiplex ability according to GSM 07.10 Multiplexer Protocol
UICC interface	Supported chip cards: UICC/SIM/USIM 3V, 1.8V
Special features	
Phonebook	SIM and phone
Antenna	SAIC (Single Antenna Interference Cancellation) / DARP (Downlink Advanced Receiver Performance) RX diversity type 3i

B.3 Lithium-Ion 2400 mAh Battery Specifications

Description	Specification
Model Number	RV3005
Part Number	1100911-000
Chemistry	Lithium-Ion (Li-Ion)
Battery Voltage	2.7 V ~ 4.2 V (minimum ~ maximum)
	3.7 V (nominal)
Capacity	2300 mAh/8.5 Whr (typical)
	2400 mAh/8.8 Whr (minimum)
Charge Current	1.15 A (typical)
Charge Voltage	4.2V +/- 0.05
Charge Method	Constant-current/constant-voltage (CC/CV)
Discharge Current	1.15 A (typical)
	2.8 A (maximum)
Internal Resistance	135 mΩ (typical)
Storage Temperature	-20°C to +60°C (-4°F to +140°F)
Charge temperature	0°C to +45°C (32°F to +113°F) (typical)
Discharge Temperature	-20°C to +60°C (-4°F to +140°F) (typical)
Charge Taper Current	48 ~ 120 mA
Charge Time	3 hrs. (typical)
Pre-condition Charge Current	200 ~ 240 mA
Pre-condition Charge Termination Voltage	3 V
Cycle Life	300 charge/discharge cycles with no degradation below 80% of nominal capacity based on 0.5 C charge / 0.5 C discharge rates (to 3.0 V) @ 23° C.

B.4 Lithium-Ion 3600 mAh Battery Specifications

Description	Specification
Model Number	RV3010
Part Number	1100912-000
Chemistry	Lithium-Ion (Li-Ion)
Battery Voltage	2.7 V ~ 4.2 V (minimum ~ maximum)
	3.7 V (nominal)
Capacity	3600 mAh/13.32Whr (typical)
	3450 mAh/12.76 Whr (minimum)
Charge Current	1.72 A (typical)
Charge Voltage	4.2V +/- 0.05
Charge Method	Constant-current/constant-voltage (CC/CV)
Discharge Current	1.72 A (typical)
	2.8 A (maximum)
Internal Resistance	125 mΩ (typical)
Storage Temperature	-20°C to +60°C (-4°F to +140°F)
Charge temperature	0°C to +45°C (32°F to +113°F) (typical)
Discharge Temperature	-20°C to +60°C (-4°F to +140°F) (typical)
Charge Taper Current	48 ~ 120 mA
Charge Time	3 hrs. (typical)
Pre-condition Charge Current	300 ~ 360 mA
Pre-condition Charge Termination Voltage	3 V
Cycle Life	300 charge/discharge cycles with no degradation below 80% of nominal capacity based on 0.5 C charge / 0.5 C discharge rates (to 3.0 V) @ 23° C.

B.5 Internal Imager

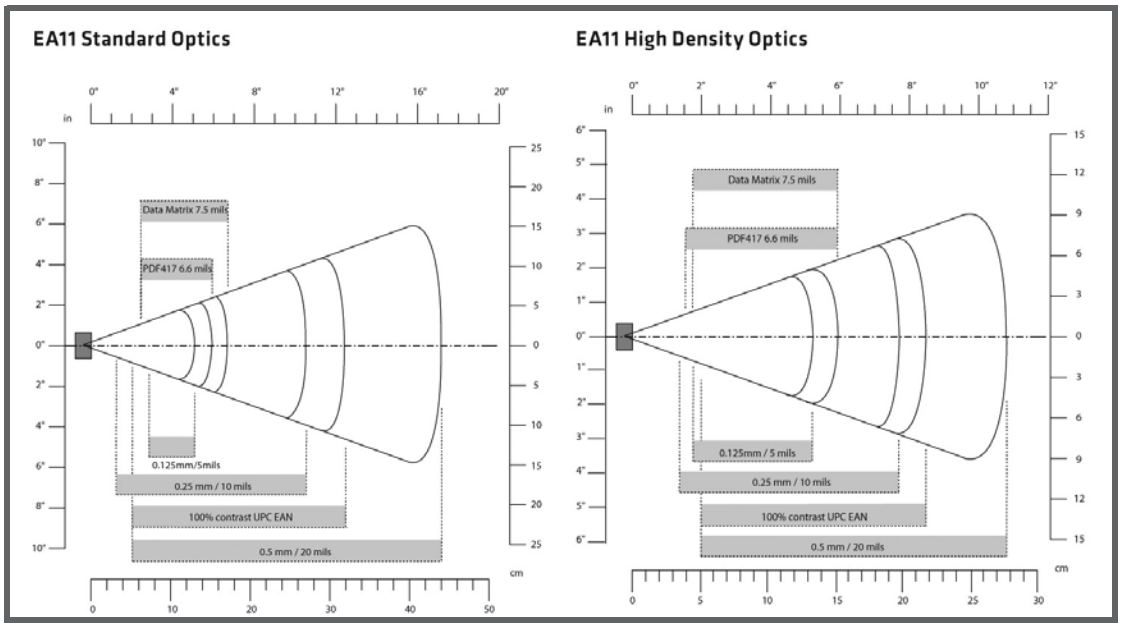
This section lists specifications for the EA11 Decoded 2D imager.

B.5.1 EA11 Decoded 2D Imager

Parameter	Specification
Scan Rate	2D mode: 56 images/s auto adaptive
Linear Emulation Mode	200 scans/s auto adaptive
Scan Angle	38.9° (horizontal), 25.4° (vertical)
Optical Resolution	752 (H) x 480 (V) pixels, 256 gray levels
Print Contrast	Down to 25%
Versions	Standard range and high density

Parameter	Specification
Symbologies - 1D	EAN/UPC, GS1 Databar (limited expanded & omni-directional), RSS, Code 39, Code 128, UCC/EAN 128, ISBN, ISBT, Interleaved/Matrix/ Industrial and Standard 2 of 5, Codabar, Code 93/93i, Code 11, MSI, Plessey, Telepen, postal codes (Australian Post, BPO, Canada Post, Dutch Post, Japan Post, PostNet, Sweden Post)
Symbologies - 2D	Data Matrix, PDF417, Micro PDF 417, Codablock Maxicode, QR, Aztec GS1 composite codes
Voltage (optics)	3.3V -5% / +10% (typical values)
Operating Current	170mA - 310mA (lighting condition dependent)
Power Saving Mode	2mA
Ambient Light	Works in any lighting conditions, from 0 to 100,000 lux
Regulatory Approvals	UL, VDE certified, RoHS compliant

B.5.1.1 EA11 Typical Reading Distances



C

APPENDIX: HDK LICENSE AGREEMENT

C.1 HARDWARE DEVELOPER KIT LICENSE AGREEMENT

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C.10 GENERAL

The laws of the Province of Ontario and the federal laws applicable therein, excluding the conflict of laws provisions, govern this Agreement. If any provision of this Agreement is deemed invalid or unenforceable by any country, that particular provision will be deemed modified to the extent necessary to make the provision valid and enforceable, and the remaining provisions will remain in full force and effect. Failure by us to insist on strict performance or to exercise a right when entitled, does not prevent us from doing so at a later time, either in relation to that default or any subsequent one.

No modifications of this Agreement shall be effective unless in writing and approved by us.

You acknowledge that you have read this Agreement, understand it, and that it is the complete agreement between you and Psion with respect to the subject matter hereof and supersedes all prior agreements, oral or written.

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