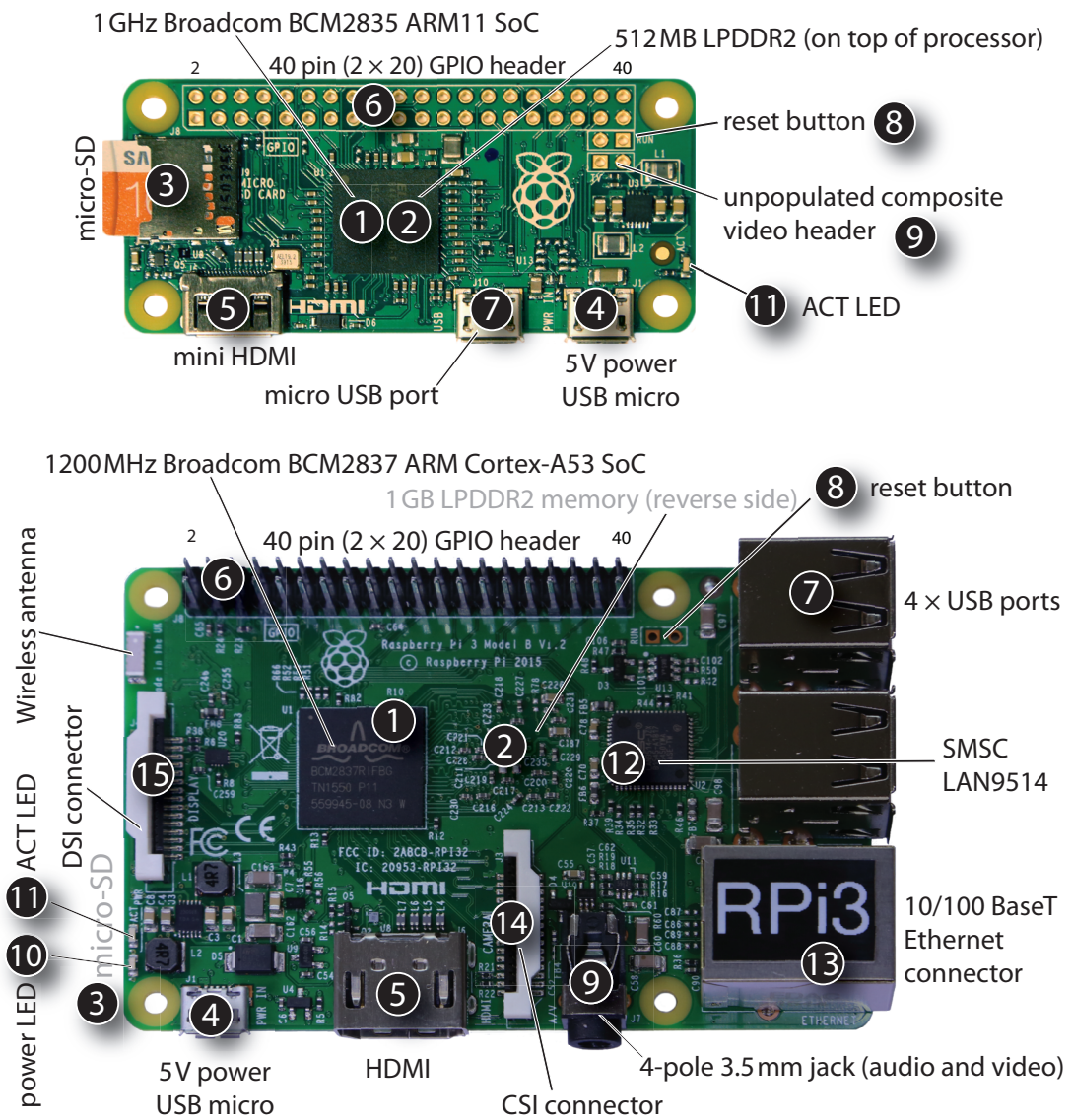


# EXPLORING RASPBERRY PI



Function	Physical	Details
1 Processor	BCM283x (CPU)	The RPi boards use the Broadcom BCM2835/BCM2836/BCM2837 processor. The different boards use slightly different processors that run between 700MHz and 1.2GHz and are based on ARMv6, ARMv7, ARMv11, and ARMv8 A53 processor cores.
	Graphics Engine (GPU)	Broadcom VideoCore® IV 3D graphics subsystem with a OpenGL ES 1.1 and 2.0 driver.
2 Memory	256MB to 1GB DDR	The amount of system memory affects performance and the use of the RPi as a general-purpose computing device. Memory is shared between the CPU and GPU.
3 Storage	micro-SD card	The RPi boards all boot from a micro-SD or SD card, with the exception of the Compute module. It has an on-board eMMC, which is effectively an SD card on a chip. The RPi 3 uses a friction-fit slot, rather than a click-in/click-out slot.
4 Power	micro-USB connector	A 5V supply is required that should ideally deliver a current of at least 1.1A and ideally 2.5A for the RPi 3. There is over-current protection on this input. Be careful not to confuse the USB hub and USB power inputs on the RPi Zero.
5 Video Out	HDMI or mini-HDMI connector	Used to connect the RPi boards to a monitor or television. The RPi models support 14 output resolutions, including full-HD (1920x1080) and 1920x1200.
6 GPIOs	40 pin (or 26 pin) GPIO header	40 pins that are multiplexed to provide access to the features listed on the following table rows. Not all functionality is available at the same time. These inputs and outputs are described in detail in Chapter 6 and Chapter 8.
		26 x GPIOs General purpose inputs outputs that are used for reading or writing binary data. The maximum number of GPIOs is 26 on the 40 pin RPi models. All GPIOs are 3.3V tolerant. Using buses and other interfaces reduces the number of available GPIOs.
		2 x I <sup>2</sup> C bus I <sup>2</sup> C is a digital bus that allows you to connect several modules to each of the two-wire buses at the same time. One of these two buses is reserved for HAT support.
		SPI bus Serial peripheral interface (SPI) provides a synchronous serial data link over short distances. It uses a master/slave configuration and requires 4 wires for communication. The RPi SPI bus has Linux support for two slave select lines.
		UART Used for serial communication between two devices. The RPi typically (except the RPi 3) has one UART device that is allocated by default to providing a serial console connection.
		PWM Pulse width modulation (PWM) outputs allow you to send a type of analog output that can be used to control devices (e.g., motors). There is at least one hardware PWM output on all RPi boards, and two on more recent boards.
7 USB Hub	USB Connectors	GPCLK General purpose clocks (GPCLK) allow you to establish accurate timing signals.
		There is an internal USB hub on RPi models with varying numbers of inputs. For example, the RPi 2/3 has five internal USB ports – one is connected to the Ethernet port and the other four are available for external connection.
8 Reset	Unpopulated RUN	Can be used as a reset button for the RPi. This topic is described later in Chapter 1.
9 Audio and Video	4-pole 3.5mm jack	This provides composite video and stereo audio on more recent boards.
10 Power LED	PWR LED	Indicates that the board is powered (not on the RPi Zero).
11 Activity LED	ACT LED	Indicates that there is activity on the board (i.e., it flashes on SD card activity).
12 USB-to-Ethernet	SMSC LAN9514	This IC provides a USB 2.0 hub and a 10/100 Ethernet Controller. The RPi boards connect to the Internet via USB rather than an on-board Ethernet controller within the SoC.
13 Network	RJ-45 Ethernet	10/100Mbps Ethernet via a RJ45 connector. The RPi3 has on-board Wi-Fi and Bluetooth using a BCM43438. See the Optional Accessories section in this chapter.
14 Camera	CSI	The RPi has a Mobile Industry Processor Interface (MIPI) Camera Serial Interface (CSI), a 15-pin connector that can be connected to a special-purpose camera. See Chapter 15.
15 Display	DSI	The Display Serial Interface (DSI) is an interface that is typically used by mobile phone vendors to interface to a screen display. There are few displays available that support this interface – one example is the 7" Raspberry Pi Touchscreen (800x480 display).