

SONY

White paper

November 2016



Xperia™ E5
F3311/F3313

Purpose of this document

Sony product white paper are intended to give an overview of a product and provide details in relevant areas of technology.

NOTE: The illustration that appears on the title page is for reference only. All screen images and elements are subject to change without prior notice.

Document history

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Sony Mobile Developer World

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Table of contents

Product overview	2
Highlights	2
Product specifications	3
Categorised feature list	6
Technologies in detail	8
Accessibility and Usability	8
Device-to-device communications (local)	9
Bluetooth® wireless technology	9
Messaging	11
MMS (Multimedia Messaging Service)	11
Email	11
Positioning – location based services	12
Provisioning (OMA CP)	12
Multimedia (audio, image and video)	13
Synchronisation (OMA DS, EAS, Google Sync™)	15
Web browser	15
Memory in Android™ devices	16
Trademarks and acknowledgements	20

Product overview

Highlights

- 13 MP camera with AF and HDR
- 5 MP front camera
- Up to 2 days* battery life
- Up to 200 GB memory card support
- Quad-core processor

A battery you can rely on

Do more and go further with Xperia™ E5. Sony has redefined battery standards, with smartphones that last up to two days* between charges.

Beautiful pictures, always

Xperia™ E5 makes it easier than ever to take stunning shots with a smartphone. Not only is the camera easy to use, it's so smart it can tell what you're shooting. With Auto Scene Recognition, Xperia™ E5 senses whether you're taking a picture of a new baby or a nouvelle cuisine dish and adjusts the flash, focus and exposure accordingly.

Zero frustration

Say goodbye to slow connections, app freezes and never-ending downloads. Xperia™ E5 delivers fast, seamless performance for that all important "it just works" experience. And if you need extra space for all your photos, videos or apps, Xperia™ E5 lets you add up to 200 GB extra memory with a microSD™ card.

** Battery life has been measured against the Sony Mobile Communications AB smartphone usage profile, defined in September 2014 to represent the typical smartphone user's active condition, including, but not limited to a range of different usage scenarios.*

Product specifications

Operating system	Google™ Android™ 6.0 (Marshmallow) without cookie upgrade
Processor	MediaTek MT6735 1.3 GHz (Quad Core)
GPU	Mali 720-MP2 450MhZ
Size	144 x 69 x 8.2 mm
Weight	147 g
Available colours	Graphite Black White
SIM card	Nano SIM
Main screen	
Colours	16,777,216 colour TFT
Resolution	HD (1280x720)
Size (diagonal)	5.0 inches
Scratch-resistant	Yes – Front with minimum pencil hardness > 6H
Input mechanisms	
Text input	On-screen QWERTY keyboard, 12-key input, Handwriting recognition
Touch screen	Capacitive
Multi-touch capability	Up to 4 fingers supported
Memory	
RAM	1.5 GB
Flash memory	Up to 16 GB*
Internal Storage	Up to 10 GB*
Expansion slot	microSD™ card, up to 200 GB
Memory card speed class	Class 10**
Memory card UHS speed class	Class 1**
Main Camera	
Camera resolution	13 MP
Exmor	No
Digital zoom	3x
Video recording	Yes
Hybrid Autofocus	No

Auto Focus	Yes
Photo Flash	Yes
ISO	1600
Minimum focus distance	100 mm
2nd Camera	
Camera resolution	5 MP
Exmor	No
Video recording	Yes
Auto Focus	No
Photo Flash	No
ISO	1600
Sensors	
Accelerometer	Yes
Ambient light sensor	Yes
eCompass	Yes
Hall sensor	No
Proximity sensor	Yes
Mobile NFC Payment	
MasterCard PayPass	Yes
Visa payWave	Yes
American Express Expresspay Mobile	Yes
Networks	
F3311	UMTS HSPA+ 850 (Band V), 900 (Band VIII), 1900 (Band II), 2100 (Band I) MHz GSM GPRS/EDGE 850, 900, 1800, 1900 MHz LTE (Bands 1, 2, 3, 5, 7, 8, 20) BT, WLAN, NFC
F3313	UMTS HSPA+ 850 (Band V), 900 (Band VIII), 1700 (Band IV), 1900 (Band II), 2100 (Band I) MHz GSM GPRS/EDGE 850, 900, 1800, 1900 MHz LTE (Bands 2, 4, 5, 7, 12, 17, 28) BT, WLAN, NFC
Data transfer speeds	
GPRS (upload and download)	Up to 85.6 kbps (download). Up to 85.6 kbps (upload).

EDGE (upload and download)	Up to 236.8 kbps (download). Up to 236.8 kbps (upload).
HSUPA (upload)	Cat. 6, up to 5.76 Mbps
HSDPA (download)	Cat. 24, up to 42.2 Mbps
LTE (upload and download)	Cat. 4, up to 50 Mbps (upload), up to 150 Mbps (download)
Battery performance	
Talk time (GSM)	Up to 11 hours 30 min.***
Standby time (GSM)	Up to 511 hours***
Talk time (UMTS)	Up to 9 hours 30 min.***
Standby time (UMTS)	Up to 518 hours***
Standby time (LTE)	Up to 525 hours***
Music listening time	Up to 65 hours***
Video playback time	Up to 11 hours 30 min.***
Battery (Embedded)	2300 mAh minimum

* The Xperia™ E5 has approximately 10 GB of free memory available to the user for downloaded applications and their data, music, pictures and movies. This device has up to 16 GB of flash memory in total. For more details about memory, see “Memory in Android™ devices” on page 16.







** This device meets the minimum hardware requirements to support Class 34 / UHS Speed Class 25 Flash memory. Flash memory performance is dependent on the application and task being performed on the device. If you would like to know about your memory card, refer to the technical specifications that came with the card.

*** Values are according to GSM Association Battery Life Measurement Technique as performed in controlled laboratory conditions. Actual time may vary.

NOTE: Battery performance may vary depending on network conditions and configurations, and device usage.

NOTE: All performance metrics are measured under laboratory conditions.

Categorised feature list

 <p>Camera Auto Focus Face Detection Geotagging HDR for Photo Image Stabiliser Object tracking Self-timer Smile Shutter™ Touch Capture Touch Focus White Balance</p>	 <p>Music Album art Bluetooth® stereo (aptX®, A2DP) Clear Audio+ Clear Bass™ Clear Phase™ Dynamic Normaliser Headset Optimisation Music application What's New* xLOUD™ Experience</p>	 <p>Internet Google Chrome™* Google Play™* Google™ search* Google Voice™ Search* Google Maps™ with Street view* What's new* Xperia™ Lounge</p>
 <p>Communication Call list Facebook™ application* Hangouts™* Noise suppression Personal Equalisation Voice Enhancement*</p>	 <p>Messaging Email Gmail™* Handwriting recognition Predictive text input</p>	 <p>Design Gesture input On-screen QWERTY keyboard Screenshot Capturing Voice input Live Wallpaper</p>



Entertainment

Radio (FM radio with RDS*)
 Sony Entertainment Network*
 YouTube™*



Organiser

Airplane mode
 Alarm/Clock/Stopwatch/Timer
 Calculator
 Contacts
 Setup guide



Connectivity

3.5 mm audio jack (CTIA)
 aGPS*
 Bluetooth® 4.1 wireless
 technology
 Device Connection
 Home Network
 Media Transfer Protocol support
 Micro USB support
 Microsoft® Exchange
 ActiveSync®
 NFC
 USB charging
 USB Connection Mode
 USB High speed 2.0 support
 Wi-Fi®
 Wi-Fi® Hotspot functionality
 Xperia™ Companion

* This service is not available in all markets.

Technologies in detail

The information presented in this section is a general overview of the technology incorporated into the product. However, hardware and software levels of compliance to standards and specifications vary between products and markets. For more information, contact Sony Mobile Developer World or the relevant Sony representative.

Accessibility and Usability

Talkback*	Yes
Captions*	Yes
Magnifications Gestures*	Yes
Large Text*	Yes
High Contrast Text*	Yes
Power button ends call*	Yes
Auto-Rotation*	Yes
Speak Passwords*	Yes
Accessibility Shortcuts*	Yes
Text-to-speech output*	Yes
Touch and hold delay*	Yes
Color Inversion*	Yes
Color Correction*	Yes

* This feature is subject to change in future releases of Google™ Android™.

Device-to-device communications (local)

Bluetooth® wireless technology

Bluetooth® profiles supported	<p>Advanced Audio Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Audio/Video Control Transport Protocol v1.4 Audio/Video Distribution Transport Protocol v1.2 Hands-Free Profile v1.6 Headset Profile v1.2 Device ID Profile v1.3 Object Push Profile v1.1 Generic Access Profile General Audio/Video Distribution Profile v1.2 Generic Object Exchange Profile v1.0 Personal Area Networking Profile Bluetooth Network Encapsulation Protocol PhoneBook Access Profile v1.1 Message Access Profile v1.2 SIM Access Profile v1.1 Serial Port Profile v1.2 GATT Client GATT Server HID over GATT Profile v1.0 Human Interface Device Profile v1.1 Interoperability Test Specification RFCOMM with TS 07.10 Bluetooth proprietary audio codec compression algorithm</p>
Core version and supported core features	Version 4.1
Other supported features	aptX® CD quality audio streaming over a Bluetooth® connection
Connectable devices	<p>Products that support at least one of the Bluetooth® profiles listed above. Bluetooth® 4.1 accessories generally require installation of a supporting application.</p>

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

Supported standards	802.11a/b/g/n Wi-Fi Direct® Wi-Fi Protected Setup
Connectable devices	Wi-Fi® access points Wi-Fi Direct compatible devices
Frequency band	2.4 GHz / 5 GHz
Data transfer rate	Up to 150 Mbit/s
Security	Open Authentication Shared Authentication WPA/WPA2 Personal and WPA2 Personal 802.1x/EAP: EAP-PEAP/MSCHAPv2/GTC EAP-TLS EAP-TTLS/MSCHAP/MSCHAPv2/PAP/GTC EAP-PWD EAP-SIM EAP-AKA
Encryption	WEP 64 bit, WEP 128 bit, TKIP and CCMP (AES)
Power save	WMM-UAPSD
QoS	WMM

Messaging

MMS (Multimedia Messaging Service)

According to OMA Multimedia Messaging Service v1.0 + SMIL

Email

Bearer type (IP)	GPRS, EGPRS, UMTS, LTE, Wi-Fi®
Character sets	BIG5 Traditional Chinese GB2312 Simplified Chinese GB18030 ISO-2022-JP Japanese ISO-8859-1 ISO-8859-2 Eastern Europe ISO-8859-5 Cyrillic ISO-8859-7 Greek ISO-8859-9 Turkish ISO 8859-11 KOI8-R Cyrillic Shift_JIS Japanese USASCII UTF-16 UTF-8 Windows® 874 Windows® 1251 Cyrillic Windows® 1252 Windows® 1254 Turkish Windows® 1258 Vietnamese
Protocols	POP3 and IMAP4
Push email	Microsoft® Exchange ActiveSync® (EAS)
Secure email	SSL/TLS, both port methods (POPS/IMAPS) and START-TLS
HTML mail	Yes (read only)

More information:

www.sonymobile.com/developer

www.openmobilealliance.org

Positioning – location based services

Supported standards:

- OMA Secure User Plane Location (SUPL) v1.0, v2.0
- 3GPP™ Control Plane location (incl. Emergency location)

Supported satellite systems:

- GPS
- GLONASS

Provisioning (OMA CP)

OMA CP version 1.1

Multimedia (audio, image and video)

Audio Playback	Decoder format	Supported in file format
	Audio decoding MPEG-1/2/2.5, audio layer 3	MP3 (.mp3)
	AAC, AAC+, eAAC+	3GPP (.3gp), MP4 (.mp4)
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4)
	General MIDI (GM)	SMF (.mid)
	Linear PCM 16 bit	WAV (.wav)
	OTA	OTA (.ota)
	Ogg Vorbis	OGG (.ogg)
	FLAC	FLAC (.flac)
Audio Recording	Encoder format	Supported in file format
	AMR-NB, AMR-WB	3GPP (.3gp), MP4 (.mp4), AMR (.amr)
	AAC-LC Channels: Mono/Stereo Sampling rate: Max 48kHz Bit rate: Up to 160kbps	3GPP (.3gp), MP4 (.mp4)
	AMR-NB Channels: Mono Sampling rate: 8kHz Bit rate: All rates (4.75kbps - 12.2kbps)	
	AMR-WB Channels: Mono Sampling rate: 16kHz Bit rate: All rates (8.8kbps - 23.85kbps)	
	Ogg Vorbis	Ogg Vorbis (.ogg)
	Linear PCM 16 bit	WAV (.wav)

Image Playback	Decoder format	Supported in file format
	1, 4, 8, 16, 24 and 32 bpp and RLE encoded formats	BMP (.bmp)
	Single and multi-frame, bitmap mask support (GIF87a format and GIF89a format)	GIF (.gif)
	Joint Photographic Experts Group	JPEG (.jpg, .jpeg)
	Portable Network Graphics Bitmap mask support	PNG (.png)
	WebP	WebP (.webp)
Image Capture	Encoder format	Supported in file format
	Joint Photographic Experts Group	JPEG (.jpg)
	Portable Network Graphics Bitmap mask support	PNG (.png)
Video Playback	Decoder format	Supported in file format
	MPEG-4 Visual Simple Profile	3GPP (.3gp), MP4 (.mp4)
	H.263 Profile 0	3GPP (.3gp), MP4 (.mp4)
	H.264 High Profile	3GPP (.3gp), MP4 (.mp4)
	VP8	VP8 (.webm)
	VP9	VP9 (.webm)
	DivX	AVI (.divx)
Video Recording	Encoder format	Supported in file format
	MPEG-4 Main Profile	3GPP (.3gp), MP4 (.mp4)
	H.263 Profile 0	3GPP (.3gp), MP4 (.mp4)
	H.264 High Profile	3GPP (.3gp), MP4 (.mp4)
Audio/Video Streaming	Streaming transport	RTSP according to 3GPPTM HTTP streaming

Synchronisation (OMA DS, EAS, Google Sync™)

OMA Data Synchronisation protocol versions 1.1.2 and 1.2

OMA Data Formats: vCard 2.1, vCalendar 1.0

Microsoft® Exchange ActiveSync® protocol version 2.5

Microsoft® Exchange ActiveSync® protocol version 12

Microsoft® Exchange ActiveSync® protocol version 12.1

Microsoft® Exchange ActiveSync® protocol version 14

Microsoft® Exchange ActiveSync® protocol version 14.1

Google Sync™

Related information:

www.sonymobile.com/developer

Web browser

Google Chrome™ for Android™ is pre-installed in markets/regions where no restrictions apply.

Related information:

<https://play.google.com/store/apps/details?id=com.android.chrome>

Memory in Android™ devices

To use Android devices efficiently, users should be aware of the different types of device memory. This knowledge is important in order to understand, for example, where data such as music, photos and videos is saved; how many apps can be downloaded from Google Play™; and how photos can be copied to a PC.

Information regarding memory presented in this section may be useful to developers when optimising applications for mobile devices.

Generally, all Android devices share the same basic memory setup. What differs is how much memory is available to you via the different types of memory, and whether your device uses an external SD card or an internal memory chip. Any information specific to the particular device model described in this White Paper is noted as such.

Types of memory

The types of memory described and numbered below are consistent with the terminology used in Sony mobile device menus and in other content relating to 2015 Xperia™ devices:

1. **Dynamic Memory** (also known as RAM) is used by applications that run when the device is turned on. The amount of Dynamic Memory influences how many applications and operating system services can run at the same time. The Android operating system automatically closes applications and services that are not being used.

However, such automatic functionality has limits. For example, if a lower amount of free RAM is available to applications after a new release of the operating system (due to increased capabilities in the system), device speed will eventually be impacted. This is the main reason that a device cannot be indefinitely upgraded to newer releases of Android™.

If you experience problems with RAM, for example, if the device runs slower than usual or if the Home application restarts frequently when you leave an application, you should minimise the use of apps that run all the time. Social networking apps that connect and update their data online and animated backgrounds are examples of apps that are always running and affect RAM performance. To minimise RAM issues, you could also consider using a static wallpaper instead of a live wallpaper.

To see which apps and services are currently active, go to **Settings > Memory**. You should have at least 50 MB, and ideally 100 MB or more, of free RAM to avoid slowdowns and application restarts.

You should also be aware that if you update the device to a later Android release, the load on the built-in Dynamic Memory will increase due to the addition of more features. As a result, the device may run slower after an update.

The Xperia™ E5 has approximately 1.5 GB of RAM available to the Android OS and any installed applications. Approximate 0.75 GB of the total RAM is in use during normal operation when the user starts using the device out of the box.

2. **System Memory** (also known as “System partition” or “/system”) is used for the Android OS and for most applications that are pre-loaded from the factory. This type of memory is normally locked, and can only be changed through a firmware upgrade. There is usually some free space available in this section of memory. However, since it is locked, you cannot save apps, photos or any other content to this memory. System Memory is reserved for future firmware upgrades, which almost always need more memory than the original firmware. You cannot see or influence the use of this memory.

3. Internal Storage is referred to as "working" memory. It can be compared to the C: drive on a PC or to the startup disk on a Mac.

This type of memory is used to store all application downloaded from the Google Play™ Store (and other sources) as well as their settings and data (such as emails, messages and calendar events, for example). All applications have an allocated area for application data. Memory dedicated to an application is inaccessible to other applications.

Some game applications also store content such as game music and game level information outside their own designated area. In most cases, an application can choose to save its data in a location of its own choosing (outside the protected application settings area). Generally, such content is not deleted when an application is uninstalled; it must be removed manually by connecting the device to a computer with a USB cable, or by using a file manager application.

Internal storage is also used for all added user content. For example, photos taken using the device's camera, media files downloaded from the Internet and file transfers are stored in this area. Typical user content includes:

- photos
- movies
- music
- Email attachments

Internal Storage will tend to fill up as a result of normal usage. Devices with a large initial Internal Storage can handle more applications and store more user content.

If the Internal Storage starts to get full, the device slows down, and in some cases it might no longer be possible to install more apps. You should always ensure that you have at least 100 MB of free Internal Storage. If not, you should consider removing some apps that you seldom use, or move content that you do not frequently access to external storage.

You can see approximately how much Internal Storage is free in **Settings > Storage & USB**. You can also view more details about how much memory is used by applications under **Settings > Apps**. In the Xperia™ E5, about 10 GB of Internal Storage is available out of the box.

Please note that in Sony Mobile 2015 products, "Internal Storage" is now the combination of what was previously known as "Device Memory" or "Phone Memory" (for applications and their data – also previously known as "/data") and "Internal Storage" (for user's content – also previously known as "/sdcard"). The changes in Internal Storage were made so that memory usage could be more flexible and to allow encryption of user content.

Memory card slot

Some products include both a large internal memory and a built-in memory card reader. Android manages devices with a built-in memory card reader and internal memory differently from a device that includes only a built-in memory card reader.

Since most applications expect only a single location for storage, such applications will not generally allow you to SAVE anything to the memory card (i.e., they do not offer the option to choose a storage location). However, some applications (for instance, the Sony Mobile "Camera" application) may actually allow you to do so. Other applications, for example, backup applications such as the Sony Mobile "Memory" application, will by definition be configured to copy content from the Internal Storage to the external SD card.

On the other hand, when it comes to reading from an external SD Card, you will be able to access content (for example, videos, photos and music) on a memory card inserted in this slot without any special consideration since the Android system searches all available memory for content. Therefore, such products may be regarded as supporting a fourth type of memory, called “External Card” or “SD Card”.

4. **SD Card** (known as “/sdcard1” from a programmer’s point of view, or by other names in other Android products) is the name for the removable SD memory card in all 2015 Sony Mobile products. As described in the previous section, this External Card memory is generally more limited in that any application can read from it, but many applications cannot save to this card. Only a few applications, including backup applications and file manger applications, have the capability to save to this card.

Backing up data to different memory types

Generally, you should not save photos, videos and other personal content solely on the internal memory of a device. If something should happen with the hardware, or if the device is lost or stolen, the data stored on the device’s internal memory is gone forever.

In a device where an SD card reader is the main memory, it is relatively easy to take the card out and copy all content to a PC or Mac, or to an entertainment device with a memory card slot. In a product featuring Internal Storage as the main memory, it is not possible to physically remove the memory. Instead, any critical or high-value content must either be copied to an external SD card by a special backup application, transferred to remote storage over a network (mobile or Wi-Fi), or to a computer via a USB cable.

To facilitate the transfer of data via a cable, the Xperia™ E5 supports Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your device and a Windows® PC or an Apple™ Mac® computer. This application is called Xperia™ Companion and it can be downloaded from the Xperia™ E5 support page.

Note that you do not need to back up or make a copy of applications that you have downloaded from the Google Play™ Store. They can normally be downloaded again after you have set up your Google account to work in a new device (or in a device where the memory has been completely erased).

Note 1:

Some Android devices, including Sony Mobile devices from 2012 and Sony Ericsson devices from 2011 and earlier, do not use a single “Internal Storage” for both applications (and their data) and user content. Instead, these devices use either an external SD card for user content, or a corresponding area of internal memory to reproduce the functionality of an SD card. In such devices, there is a fixed limit between the application area (“/data”) and the user content area (“/sdcard”), with the result that user content can build up and reach this limit. When the user content reaches this limit, no additional data can be added using any application. For example, the camera application would no longer be able to capture additional photos even if a considerable amount of free space was available in the application area. This limit also applies to the application area. Downloading and installing new applications would not be possible even if there was enough free memory in the user content area.

Note 2:

Some devices with integrated storage have abandoned the distinction between the application area and the content area when it comes to a Factory Data Reset. As a result, there is no option in such devices to perform a Factory Data Reset and preserve content. In such devices, all content is completely deleted from the device when a reset is performed.

In contrast, Sony Mobile’s memory integration solution makes it possible to preserve user content in this situation. Therefore, when performing a Factory Data Reset, the default action will still be to only remove applications and their data, and an option box must be checked if all content is to be removed as well (as might be desirable when selling the device second-hand).

Note 3:

For a developer, it is important to note that from a programming point of view the location names used to refer to the different memory areas described in Note 1 are still valid, i.e., the area used for applications (“/data”) is still present, as is the area used for content (“/sdcard”).

In reality, “sdcard” is a “symbolic link” to “/data/media”. However, from inside an Android application, “/sdcard” can still be used. For example, you can use “sdcard/DCIM/100Android” to find all camera images. The continued use of “/sdcard” to access the content area ensures compatibility across different products and Android releases in this regard.

Trademarks and acknowledgements

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