

SONY

White paper

November 2017



Xperia™ R1/R1 Plus
G2199/G2299

Purpose of this document

Sony product white paper is 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

| Version | | |
|------------------------------|-------------------------------|-----------|
| September 2017 | First released version | Version 1 |
| Sep. 15 th , 2017 | Updated based on SID feedback | Version 2 |
| Sep. 25 th , 2017 | Updated based on SID feedback | Version 3 |
| Nov. 1 st , 2017 | Updated based on SID feedback | Version 4 |
| Nov. 9 th , 2017 | Updated based on SID feedback | Version 5 |
| Nov. 13 th , 2017 | Updated based on SID feedback | Version 6 |

This White paper is published by:

Sony India Pvt. Ltd.,
A-18, Mohan Co-Operative Industrial Estate,
Mathura Road, New Delhi, Delhi 110044

www.sony.co.in/electronics/mobile-tablets

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First released version (September 2017)

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Product overview

Highlights

- 5.2" HD display with 2.5D glass for a comfortable fit
- 8 MP wide angle front camera with face recognition for standout selfies
- 13MP rear camera with autofocus and quick launch & capture
- High efficiency Octa-core processor with fast 4G network technology
- eMBMS enabled
- Android "N" with upgrade option

A premium 5.2" design with simple extruded form

Xperia™ R1/R1 Plus's uncluttered design is meant to fit seamlessly into your life. The soft, rounded form with a loop surface and 2.5D curved glass makes it comfortable to hold, while the stunning colours are designed to suit your style

The performance you need

Combine an Octa-core processor with 2/3GB RAM, and you have the speed and power you need, no lag, no hassle, just smooth performance

Capture the everyday magic

With an easy-to-use 13MP camera at hand, you're always ready to catch and share life as it happens. In vivid, lifelike colors

Wide-angle selfie lens

The hand shutter feature makes it easier to capture the group. Hold your palm up to the front camera to automatically take your selfie

Product specifications

| | |
|-----------------------------|--|
| Operating system | Google™ Android™ 7.0 (Nougat) |
| Processor | Qualcomm MSM8937 up to 1.4 GHz (Octa Core, 64-bit) |
| GPU | Qualcomm® Adreno™ 505 GPU |
| Size | 73.2 x 146 x 8.89 mm |
| Weight | 154 g |
| Available colours | Black/Silver |
| SIM card | Dual nano SIMs |
| Main screen | |
| Colours | 16.7M colour |
| Resolution | HD (1280x720) |
| Size (diagonal) | 5.2 inches |
| Scratch-resistant | Yes (Front with minimum pencil hardness > 7H) |
| Input mechanisms | |
| Text input | On-screen QWERTY keyboard |
| Touch screen | Capacitive |
| Multi-touch capability | 10 fingers |
| Memory | |
| RAM | 2/3GB DDR3 |
| Flash memory | G2199: Up to 16GB* G2299: Up to 32GB* |
| Internal Storage | G2199: Up to 9GB* G2299: Up to 24GB* |
| Expansion slot | microSD™ card, max 128GB |
| Memory card speed class | Class 10** |
| Memory card UHS speed class | Class 1** |
| Main Camera | |
| Effective pixels | 13MP |
| Exmor | Yes (IMX258) |
| Clear image zoom | Yes, 8x |
| Video recording | Yes (1080*1920 30 fps) |
| Autofocus | Yes, PDAF |

| | |
|-------------------------------|--|
| Photo Flash | Yes |
| ISO | ISO 3200 maximum for photos |
| | ISO 2400 maximum for video |
| Minimum focus distance | 100 mm |
| 2nd Camera | |
| Effective pixels | 8MP |
| Exmor | No (S5K4H8) |
| Video recording | Yes (1080*1920 20 fps) |
| Auto Focus | No |
| Optical Image Stabilizer | No |
| Photo Flash | No |
| ISO | ISO 3200 maximum for photos |
| | ISO 2400 maximum for video |
| Sensors | |
| Accelerometer | Yes |
| Ambient light sensor | Yes |
| eCompass | Yes |
| Hall sensor | Yes |
| Proximity sensor | Yes |
| Networks | |
| G2199/G2299 | 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, 40,41(120MHz)) |
| 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 296 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) |
| USB & Charger | |
| USB | USB 2.0, Type-C |
| Charger | 5V1.5A charger |

| Battery performance | |
|----------------------------|---------------------------|
| Talk time (GSM) | Up to 12 hours |
| Standby time (GSM) | Up to 550 hours*** |
| Talk time (UMTS) | Up to 16 hours.*** |
| Standby time (UMTS) | Up to 478 hours*** |
| Standby time (LTE) | Up to 518 hours*** |
| Music listening time | Up to 62 hours 13 min.*** |
| Video playback time | Up to 8 hours 16 min.*** |
| Battery (Embedded) | 2620 mAh |

* The Xperia™ R1/R1 Plus has approximately 9GB (G2199) or 24GB (G2299) of free memory available to the user for downloaded applications and their data, music, pictures and movies. This device has up to 16GB (G2199) or 32GB (G2299) of flash memory in total. For more details about memory, see “Memory in Android™ devices” on page 19.

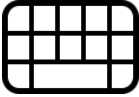





** This device meets the minimum hardware requirements to support Class 10 / UHS Speed Class 1 Flash memory. Flash memory performance is dependent on the application and task being performed on the device. If you would like to know about your memory card, refer to the technical specifications that came 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>Text Input On-screen QWERTY keyboard* SwiftKey™ Predictive text input</p> |  <p>Messaging Email Multimedia messaging (MMS) Text messaging (SMS)</p> |  <p>Entertainment FM Radio</p> |
|  <p>Display Auto rotation Multi-window Screenshot capturing Smart backlight control</p> |  <p>Organiser Airplane mode Alarm clock Calculator Contacts Stopwatch Timer</p> |  <p>Google Gmail™ Google Calendar Google Chrome™ Google Drive Google Photos Google Play Movies Google Play Music Google Play Store Google™ search Google Voice™ Search* Google Maps™ Smart Lock YouTube™</p> |

| | | |
|---|---|--|
|  <p>Camera - Photo Wide-angle* Color & Brightness Flash** HDR Auto focus** Red-eye reduction Save location Self-timer Touch capture White balance - Video Auto focus** Color & Brightness Front-facing camera (1080p)* Save location Touch capture</p> |  <p>Music Album art Bluetooth® stereo (A2DP) Music application</p> |  <p>Connectivity GPS + GLONASS Bluetooth® 4.2 wireless technology Cast Media Transfer Protocol support USB charging USB Connection mode USB High speed 2.0 support USB Host USB Type-C™ Wi-Fi® Wi-Fi® Hotspot functionality Wi-Fi CERTIFIED Mi</p> |
|---|---|--|

* This feature is only supported by the front camera.

** This feature is not supported by the front camera.

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 Control Transport Protocol Profiles v1.4 Audio/Visual Distribution Profile v1.3 Audio/Video Remote Control Profile v1.3 Bluetooth Network Encapsulation Protocol v1.0 Device ID Profile v1.3 Generic Access Profile General Audio/Video Distribution Profile v1.2 Generic Object Exchange Profile v1.0 Hands-Free Profile v1.6 Human Interface Device Profile v1.0 Headset Profile v1.2 Interoperability Test Specification Message Access Profile v1.0 Object Push Profile v1.1 Personal Area Networking Profile v1.0 PhoneBook Access Profile v1.1 RFCOMM with TS 07.10 v1.1 SIM Access Profile v1.1 Serial Port Profile v1.2 GATT Client GATT Server Find Me Profile v1.0 HID over GATT Profile v1.0 Proximity Profile v1.0 Bluetooth proprietary audio codec compression algorithms</p> |
| Core version and supported core features | Version 4.2 |
| 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 | 802.11/b/g/n Wi-Fi Miracast Wi-Fi Direct® Wi-Fi Protected Setup |
| Connectable devices | Wi-Fi® access points Wi-Fi Direct compatible devices |
| Frequency band | 2.4GHz |
| Data transfer rate | Up to 150Mbit/s |
| Security | Open Authentication Shared Authentication WPA/WPA2 Personal and WPA2 Personal 802.1xEAP: 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) v2.0

Supported satellite systems:

- GPS
- GLONASS

NOTE: When needed, the device automatically uses a combination of all available satellite systems to accurately provide location information.

Provisioning (OMA CP)

Support OMA CP

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) |
| | Ogg Vorbis | Ogg Vorbis (.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 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) | 3GPP (.3gp), MP4 (.mp4) |
| | Ogg Vorbis | Ogg Vorbis (.ogg) |

| | | |
|------------------------------|---|--|
| 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) |
| | Wbmp | Wbmp (.wbmp) |
| Image Capture | Encoder format | Supported in file format |
| | Joint Photographic Experts Group | JPEG (.jpg) |
| | Portable Network Graphics Bitmap mask support | PNG (.png) |
| | WebP | WebP (.webp) |
| Video Playback | Decoder format | Supported in file format |
| | MPEG-4 Simple Profile | 3GPP (.3gp), MP4 (.mp4) |
| | MPEG-4 Advance Profile | 3GPP (.3gp), MP4 (.mp4) |
| | H.263 Baseline | 3GPP (.3gp), MP4 (.mp4) |
| | H.264 Main Profile | 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 Simple 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 3GPP™ HTTP progressive streaming Apple HTTP Live streaming |

Synchronisation (OMA DS, EAS, Google Sync™)

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 2017 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 > Storage & memory**. You should have at least 50MB, and ideally 100MB 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™ R1/R1 Plus has approximately 2/3GB of RAM available to the Android OS and any installed applications. Approximate 1.2GB 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 100MB 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 & memory**. You can also view more details about how much memory is used by applications under **Settings > Storage & memory**. In the Xperia™ R1/R1 Plus, about 9GB (G2199) or 24GB (G2299) of Internal Storage is available out of the box.

Please note that in Sony Mobile 2017 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 2017 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 manager 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™ R1/R1 Plus supports Media Transfer Protocol (MTP), which makes it possible to easily transfer content back and forth between your device and a Windows® PC.

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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