

SONY

White paper

July 2017



Xperia™ L1
G3312

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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Product overview

Highlights

- 5.5" HD display
- Fast performance
- Adapts to you

Smooth performance, standout design.

Super-easy to use and a beautiful 5.5" display – meet the smartphone that performs as good as it looks.

An impressive display

View it all in glorious detail. Xperia™ L1 features a high-quality 5.5 display with loop surface design and narrow borders, so you can view and share everything. Xperia™ L1 is not just a pleasure to behold. With its smooth, rounded frame, it fits and feels great in your hand.

The performance you need

Combine a quad core processor with 2GB RAM, and you have the speed and power you need. No lag. No hassle. Just smooth performance.

Adapts to your habits

Xperia™ L1 learns and adapts based on how you use it, getting smarter and more personal every day.

Product specifications

Operating system	Google™ Android™ 7.0 (Nougat)
Processor	MediaTek MT6737T 1.45GHz Quad Core
GPU	Mali 720-MP2 450MHz
Size	151 x 74 x 8.7 mm
Weight	180 g
Available colours	Black/White/Pink
SIM card	Dual nano SIM
Main screen	
Colours	16,777,216 colour TFT
Resolution	HD (1280 x 720)
Size (diagonal)	5.5 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	4 fingers
Memory	
RAM	2GB DDR3
Flash memory	Up to 16GB*
Internal Storage	Up to 9GB*
Expansion slot	microSD™ card, max 256GB
Memory card speed class	Class 10**
Memory card UHS speed class	Class 1**
Main Camera	
Effective pixels	13MP
Exmor	No
Clear image zoom	3x
Video recording	Yes
Autofocus	Yes
Photo Flash	Yes

ISO	ISO 3200 maximum in auto mode for photos
	ISO 3200 maximum for video
Minimum focus distance	100 mm
2nd Camera	
Effective pixels	5MP
Exmor	No
Video recording	Yes
Auto Focus	No
Photo Flash	No
ISO	ISO 1600 maximum in auto mode for photos
	ISO 1600 maximum for video
Sensors	
Accelerometer	Yes
Ambient light sensor	Yes
eCompass	Yes
Hall sensor	Yes
Proximity sensor	Yes
Mobile NFC Payment	
MasterCard PayPass	Yes
Visa payWave	Yes
American Express Expresspay Mobile	Yes
Networks	
G3312	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), WLAN, 2.4G/5G, NFC GSM 850/900 : Power Class 4, DCS(1800)/PCS(1900) : Power Class 1, UMTS : Power Class 3, LTE : Power Class 3, 2.4GHz<100mW, 5.15-5.35GHz<200mW, 5.47-5.725GHz<500mW, NFC 13.56MHz

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 12 hours 53 min.***
Standby time (GSM)	Up to 531 hours***
Talk time (UMTS)	Up to 11 hours 32 min.***
Standby time (UMTS)	Up to 531 hours***
Standby time (LTE)	Up to 651 hours***
Music listening time	Up to 63 hours 1 min.***
Video playback time	Up to 8 hours 22 min.***
Battery (Embedded)	2620 mAh

* The Xperia™ L1 has approximately 9GB of free memory available to the user for downloaded applications and their data, music, pictures and movies. This device has up to 16GB of flash memory in total. For more details about memory, see “Memory in Android™ devices” on page 18.

** 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

 Call Enriched calling*	 Messaging Email Multimedia messaging (MMS) Text messaging (SMS)	 Applications Amazon Shopping* Facebook™ application* Introduction to Xperia™ Weather application What's new Xperia™ Companion Xperia™ Lounge* Xperia™ Tips
 Entertainment Xperia™ Themes FM Radio	 Organiser ActiveSync® Airplane mode Alarm clock AVG Protection Calculator Contacts Smart cleaner STAMINA Mode Stopwatch Timer Ultra STAMINA Mode World clock Xperia™ Actions	 Google Gmail™* Google Calendar Google Chrome™* Google Duo™* Google Drive Google Docs, Sheets and Slides Google Photos Google Play Movies Google Play Music Google Play Store Google™ search* Google Voice™ Search* Google Maps™* Smart Lock YouTube™*

 Camera - Photo - Color & Brightness - Flash/Pulsed LED*** - Flash/Photo light*** - Auto Focus*** - HDR - Geo tagging - Image stabiliser - Object tracking*** - Red-eye reduction*** - Save location - Self-timer - Smile Shutter™ - Scene recognition - Touch capture - White balance - Video - Auto focus*** - Color & Brightness - Front-facing camera (1080p)** - Geo tagging - Object tracking*** - Save location - Smile Shutter™ - Touch capture	 Music - Surround Sound (VPT) - Album art - Headset optimisation - Bluetooth® stereo (aptX®, A2DP) - ClearAudio+ - Clear Bass™ - xLoud™ - Dynamic normalizer - Music application - Spotify*	 Connectivity - aGNSS - Bluetooth® 4.2 wireless technology - Cast - Media Transfer Protocol support - NFC - USB charging - USB Connection mode - USB High speed 2.0 support - USB Type-C™ - Wi-Fi® - Wi-Fi® Hotspot functionality
 Text Input - Gesture input* - On-screen QWERTY keyboard* - SwiftKey™ - Predictive text input	 Display - Auto rotation - Multi-window - Screen zoom - Screenshot capturing - Smart backlight control	

* This service is not available in all markets.

** 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	Advanced Audio Distribution Profile v1.2 Audio/Video Control Transport Protocol Profiles v1.4 Audio/Visual Distribution Profile v1.2 Audio/Video Remote Control Profile v1.3 Bluetooth Network Encapsulation Protocol v1.0 Bluetooth proprietary audio codec compression algorithms Device ID Profile v1.3 Generic Access Profile General Audio/Video Distribution Profile v1.2 Hands-Free Profile v1.6 Headset Profile v1.2 Health Device Profile v1.1 Human Interface Device Profile v1.1 Message Access Profile v1.2 Multi-Channel Adaptation Protocol 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 HID over GATT Profile v1.0
Core version and supported core features	Version 4.2
Other supported features	aptX® CD quality audio streaming over a Bluetooth® connection
Connectable devices	Products that support at least one of the Bluetooth® profiles listed above. Bluetooth® 4.1 accessories generally require installation of a supporting application.

More information:

www.sonymobile.com/developer

www.bluetooth.com

Wi-Fi®

Supported standards	IEEE 802.11a/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/5GHz
Data transfer rate	Up to 150Mbit/s
Security	Open Authentication Shared Authentication WPA/WPA Personal and WPA/WPA2 Enterprise 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

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

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 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)
	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)
	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 Advanced 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)
	H.265 Main 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)
	H.265 Main 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 > 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™ L1 has approximately 2GB of RAM available to the Android OS and any installed applications. Approximate 200MB 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 & memory**. You can also view more details about how much memory is used by applications under **Settings > Apps**. In the Xperia™ L1, about 9GB 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™ L1 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™ L1 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.

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