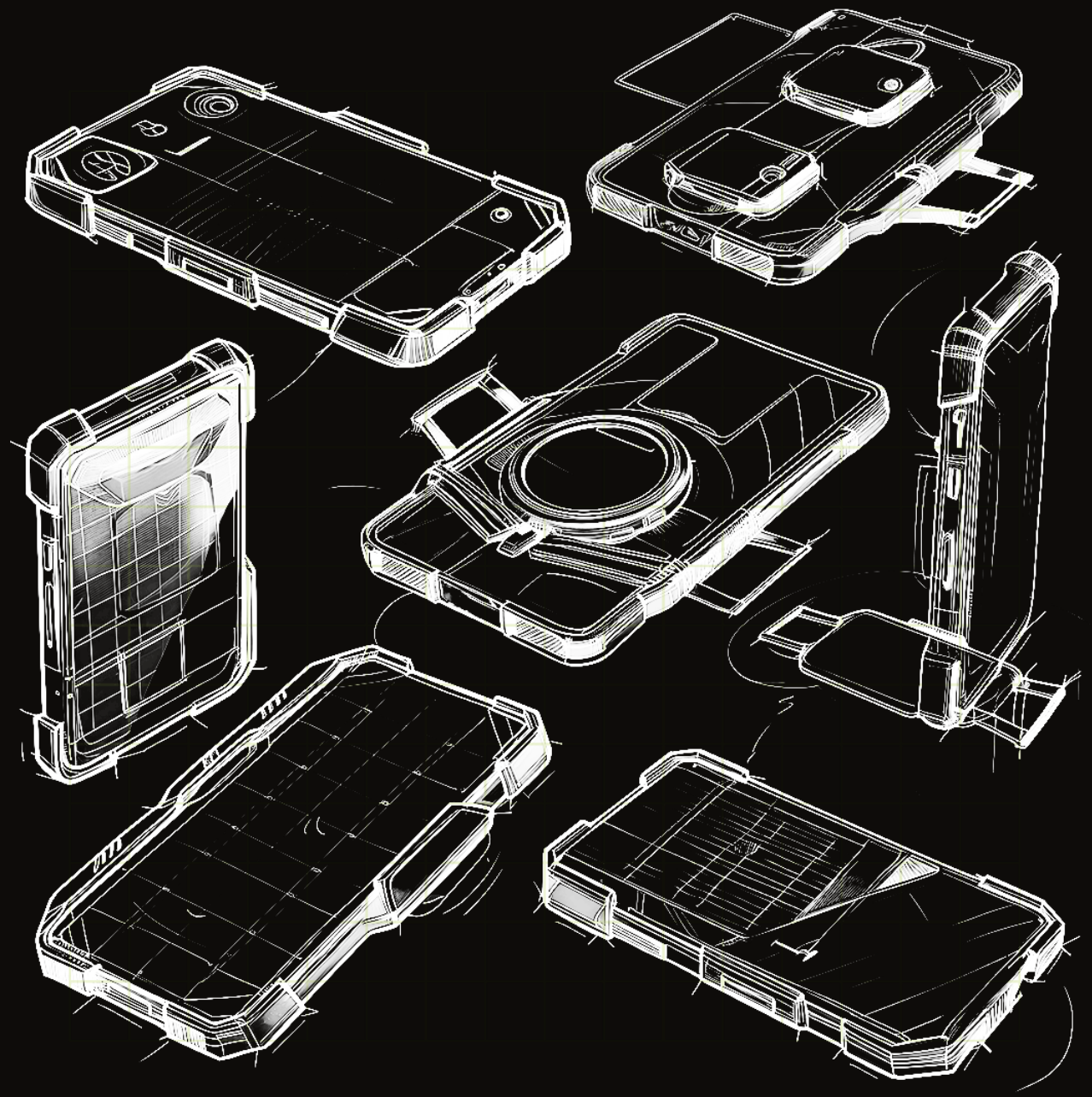
HMD FUSION

Development Toolkit – V3.0
March 2025

HMD

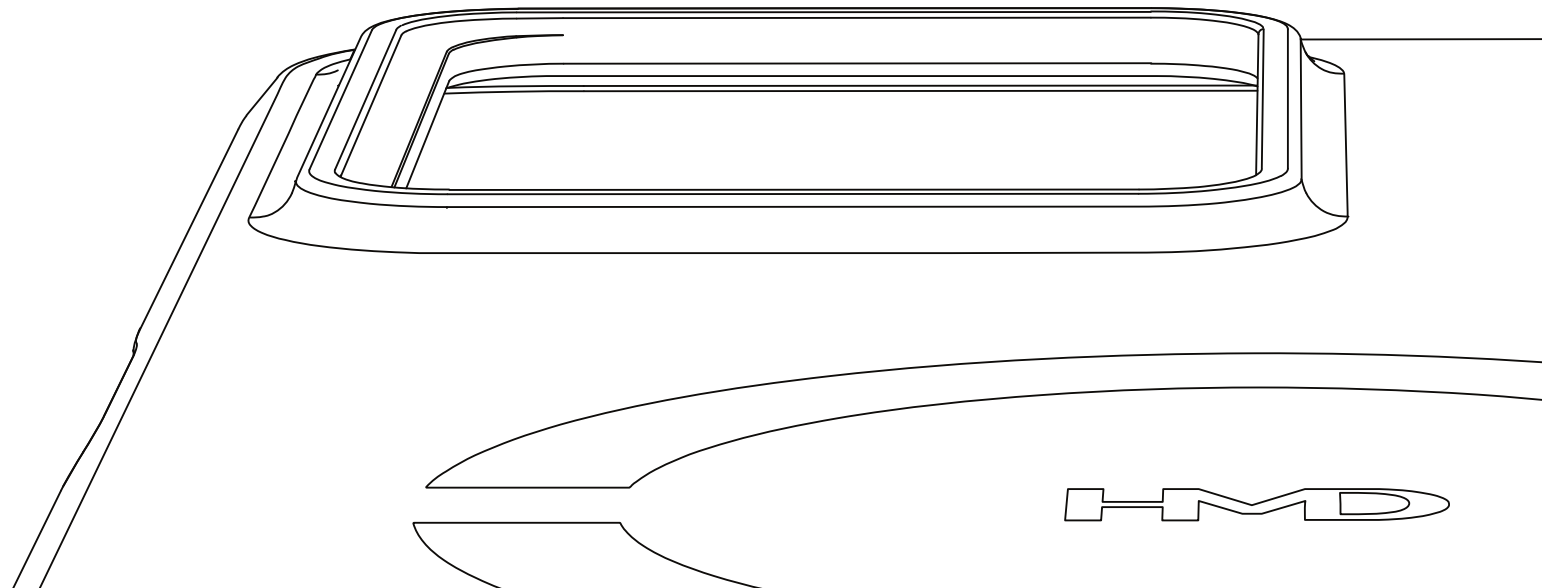


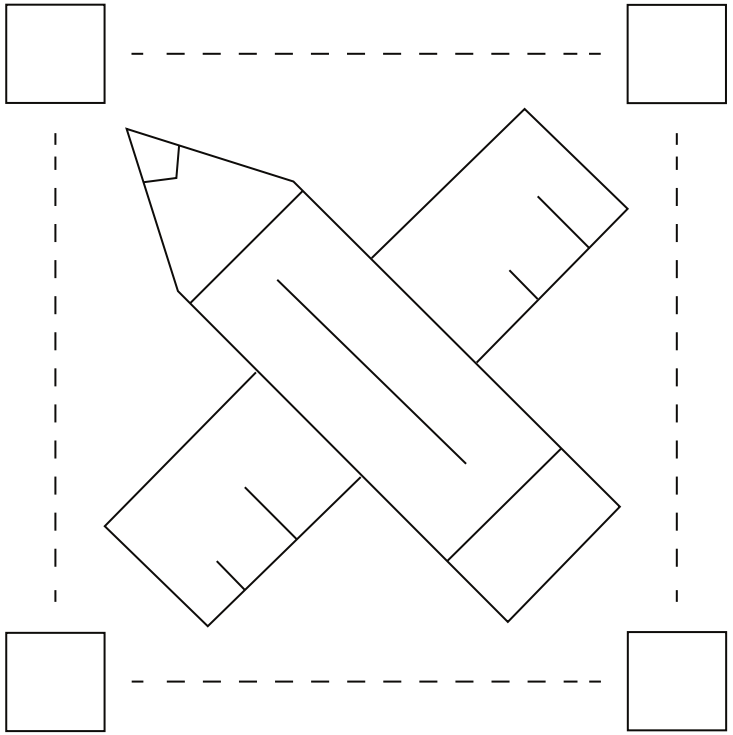
INTRODUCTION

With HMD Fusion we are introducing what we see as a radically new and innovative approach to smartphones and what they can do.

Our ambition is for HMD Fusion to provide a platform for innovation for businesses, startups, communities and people around the world – making new applications of smartphone technology more accessible and flexible for everyone.

HMD Fusion features next-generation design innovation including built-in hardware connectors that enable endless new applications to extend the functionality of HMD Fusion with what we are calling “smart outfits.” Examples of possible smart outfits could be as simple as a case with a cover that removes the constant interruption of digital notifications,
a retail payment terminal to scan barcodes and accept payments, or any other number of exciting ideas for outfits that you might create.





YOUR TURN

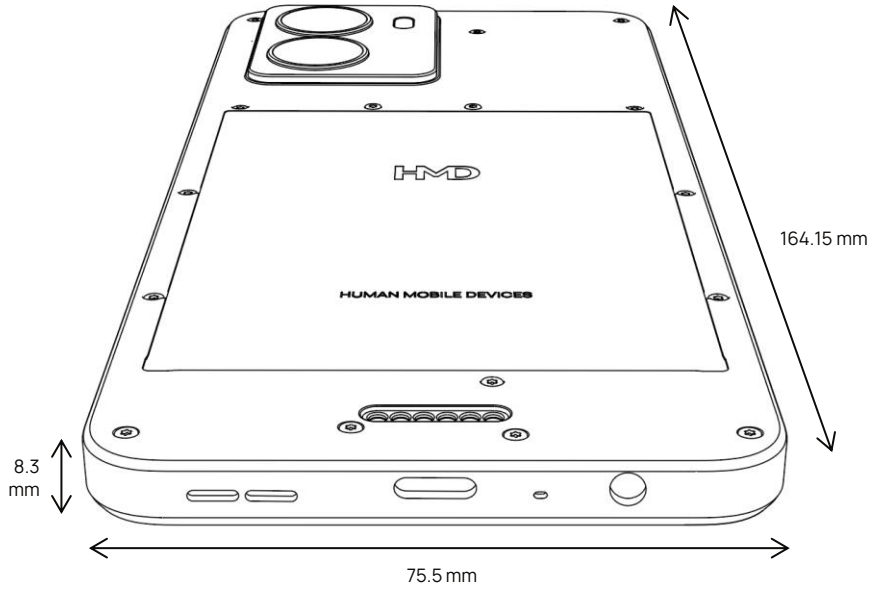
At HMD, we are exploring many possibilities for new smart outfit applications and use cases – and we'll be bringing several of our own exciting smart outfits to market later this year – but our vision is to open up the world of possibilities by providing you with the design specifications and technical specifications necessary

to create smart outfits yourself.

IMPORTANT NOTE: This version of the Development has been updated to include final physical dimensions for HMD Fusion. We recommend that you use a physical HMD Fusion to measure and test the exact tolerances needed for engineering/fabrication. Please visit our Discord community if you have questions while creating your own smart outfit.

DESIGN SPECS

The physical design of HMD Fusion is a streamline computing core at its heart. A minimalistic high-tech design creates space for endless possibilities for new and innovative applications leveraging HMD Fusion as a computing platform.



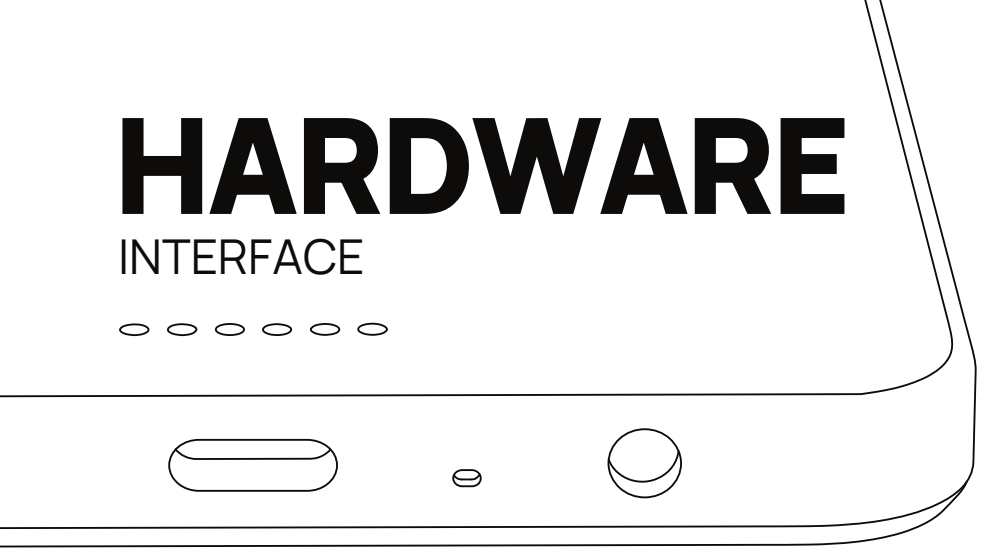
3D files for smart outfit creation

To help you design and create your own smart outfits, we're sharing 3D source files with a simplified outline of the HMD Fusion phone, along with example reference smart outfit. You can use these files to design your own smart outfit using your preferred 3D software.

To help enable the creation of smart outfits that bring these new applications to life, you'll find the details of the physical dimensions, specifications and tolerances needed to create smart outfits on your own.

DOWNLOAD > >
example 3D files here

HARDWARE
INTERFACE



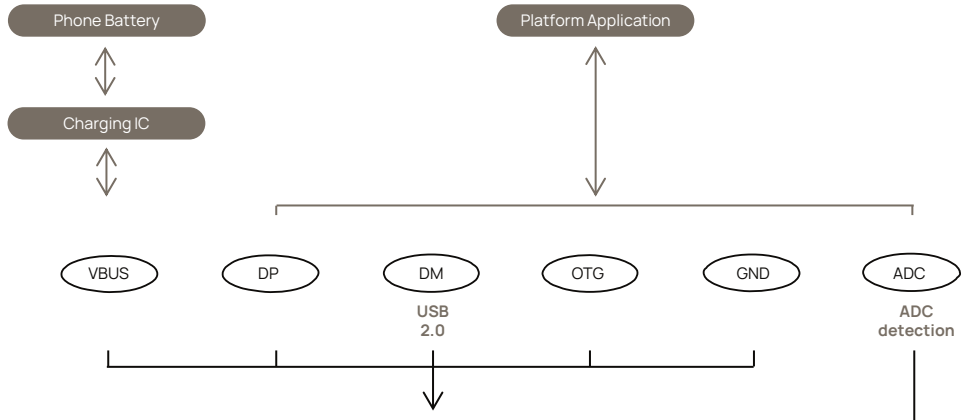
The hardware interface includes six electrical connector pins. These pins serve as the hardware electrical interface between the HMD Fusion device and smart outfit.

The six pins are arranged in a single horizontal row (with equal spacing) on the back of the HMD Fusion device and are designed to follow standard hardware implementations.

HMD Fusion is designed with a hardware interface that creates a connection between the smartphone computing platform and functionally enabled outfits.

The HMD Fusion hardware interface uses a smart “pogo pin” or spring-loaded pin based electrical connector mechanism.

smart “pogo pin”

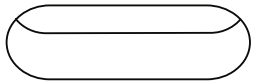


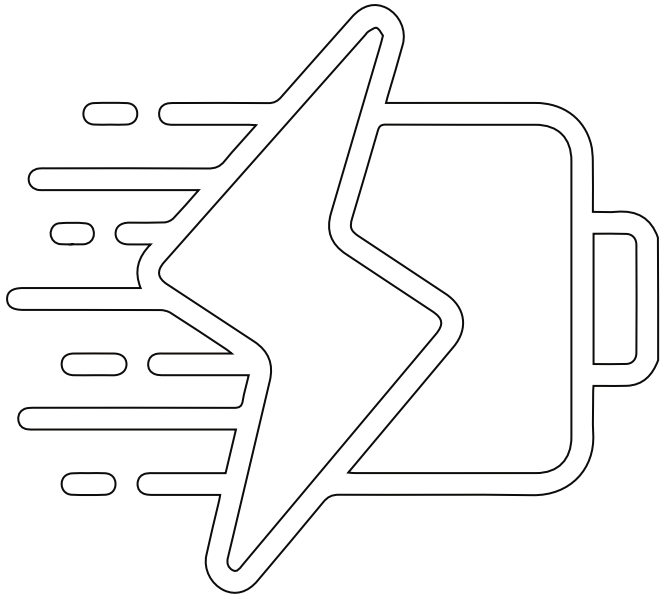
There are two separate functions for the pin hardware interface. The first five pins (pins #1 through #5) function as a standard a USB 2.0 interface for data transfer between the HMD Fusion device and the smart outfit.

The sixth pin (pin #6) can be used for ADC (analog-to-digital converter) detection. The exact function of the ADC detection can be used for bespoke use cases defined by the smart outfit/application being developed.

USB 2.0 compatible interface

USB 2.0 interfaces support two modes: USB host and accessories. You can implement the interface with the HMD Fusion device in host mode and the smart outfit in accessory mode, or the smart outfit in host mode and the HMD Fusion device in accessory mode.





POWER SPECS

Power specifications

Power can flow in two directions: either from the HMD Fusion device to the smart outfit, or from the smart outfit to the HMD Fusion device.

HMD Fusion device

↓ ↑

Smart outfit

In “power mode”, the HMD Fusion device will be able to provide a maximum power of 5W to the smart outfit.

In “charging mode”, the smart outfit will be able to provide up to 15W of power to the HMD Fusion device.

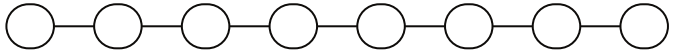
Reading ADC pin – Demo APK

ADC detection demo Android™ package

Detection of the ADC values being passed from the smart outfit to the HMD Fusion device is possible from within the Android application layer.

To help you with this, we have created a demo Android package (.apk) that reads and displays the ADC values transmitted between the smart outfit and HMD Fusion via the ADC pin.

**DOWNLOAD ›› **
demo Android Package here



ADC value detection

The ADC pin has been designed to be used to pass a status indicator or value between the smart outfit and the HMD Fusion device. This can be used for simple use cases such as triggering behaviour on the HMD Fusion device (e.g. changing wallpaper) based on the value provided by the smart outfit via the ADC pin.

There are a total of eighteen (x18) unique values that can be set to communicate between the smart outfit and the HMD Fusion device via the ADC pin (#6). The exact function/use of the individual ADC values can be defined by the smart outfit being developed. The following table lists the individual resistor values (in ohms) and ADC values (in volts):

HMD Fusion Platform Smart Pin (Pin #6)		
	Resistor Value (Ω 0.1%)	ADC Value (Voltage V)
1	1.2K	[0.010-0.090]
2	7.2K	[0.090-0.190]
3	14K	[0.190-0.341]
4	26K	[0.341-0.440]
5	35K	[0.440-0.540]
6	46K	[0.540-0.632]
7	58K	[0.632-0.736]
8	74K	[0.736-0.825]
9	90K	[0.825-0.934]
10	114K	[0.934-1.031]
11	142K	[1.031-1.139]
12	181K	[1.139-1.241]
13	231K	[1.241-1.340]
14	299K	[1.340-1.440]
15	421K	[1.440-1.540]
16	633K	[1.540-1.630]
17	1M	[1.630-1.695]
18	4M	[1.695-1.850]

Reading ADC pin – Sample code

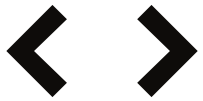
ADC value detection sample code

To help you with your implementation, you will also find sample code in Java™ demonstrating how to read and display the ADC values transmitted between the smart outfit and HMD Fusion via the ADC pin.

Java:

```
// Define the node
private static final String smart_avc = "cat
/sys/bus/iio/devices/iio:device0/in_voltage_pm6450_smart_adc_therm_input";
// Read the node
String res = "";
try {
    Process process = Runtime.getRuntime().exec(smart_avc);
    process.waitFor();
    BufferedReader reader = new BufferedReader(new InputStreamReader(process.getInputStream()));
    String line;
    while ((line = reader.readLine()) != null) {
        res += line;
    }
} catch (Exception e) {
    e.printStackTrace();
}
// Display the result
try {
    String str = "Smart avc:" + res;
    smartAvc.setText(str);
} catch (IOException e) {
    e.printStackTrace();
}
```

Smart Pin VBUS Power Management



Status check & VBUS on/off settings

VBUS management settings control the on/off behavior of the 5V (VBUS) USB power supply line from HMD Fusion via the smart pins.

To help with your implementation, you will find here details of how you can check the status of and update the on/off behavior settings.

OS support & default behavior

By default, HMD Fusion provides a 5V power supply (VBUS) through the USB connection via the smart pins. Supported from Android™ 14 onwards, the VBUS power supply on/off behavior can be updated and managed via settings supported by HMD Fusion.

Power on/off management

VBUS power on/off behavior can be updated and set in two ways:

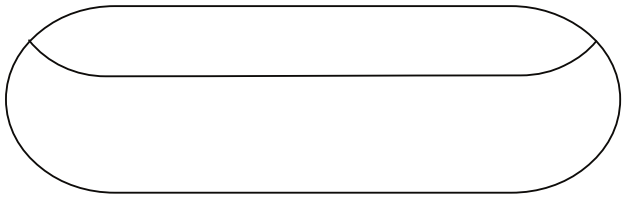
1. Detected by HMD Fusion screen on/off:
    - VBUS power will be turned off 10 minutes after screen is turned off.
    - VBUS power will be turned on immediately when screen is on.
2. VBUS power can also be control by the following API directly:

```
Java:

private void sendVbusControlIntent(boolean turnOn) {
        String action = turnOn ? ACTION_TURN_ON_VBUS : ACTION_TURN_OFF_VBUS;
        Intent intent = new Intent(action);
        intent.putExtra(EXTRA_FORCE_BYPASS, value: true);
        sendBroadcast(intent);
}
```

Status check

HMD Fusion Smart Pin VBUS power status can be read by fetching the show_vbus_status:

```
Java:

String status =
Settings.Global.getString(this.getContentResolver(),"show_vbus_status");
```



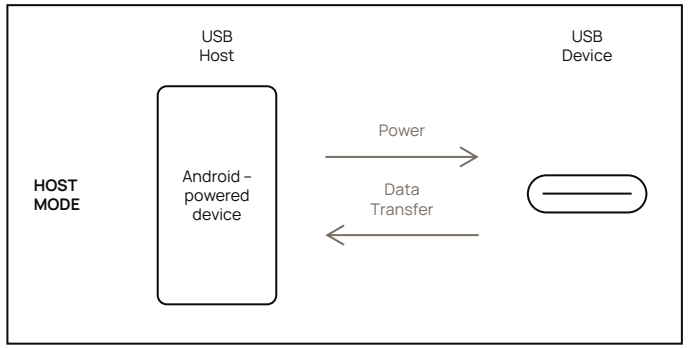
ANDROID™ & USB 2.0 APIs

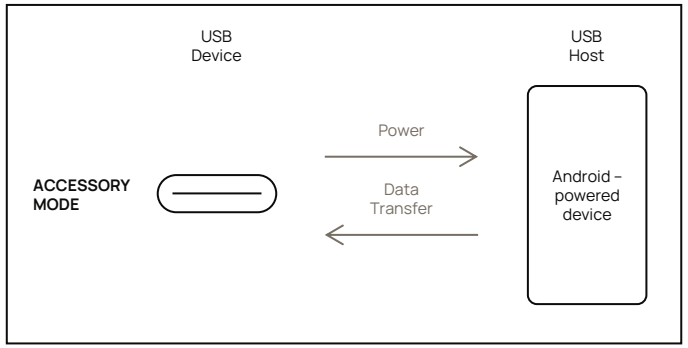
Android support

HMD Fusion will be released with Android 14. Android supports a variety of USB peripherals and Android USB accessories like the HMD Fusion smart outfits through two modes: USB host and USB accessory mode.

USB 2.0 Software APIs

The smart pin hardware interface is compatible with software implementations using standard USB 2.0. We recommend using standard software implementations of USB 2.0 interfaces, for example using open-source interface APIs such as Android USB standard API and Android Open Accessory 2.0.

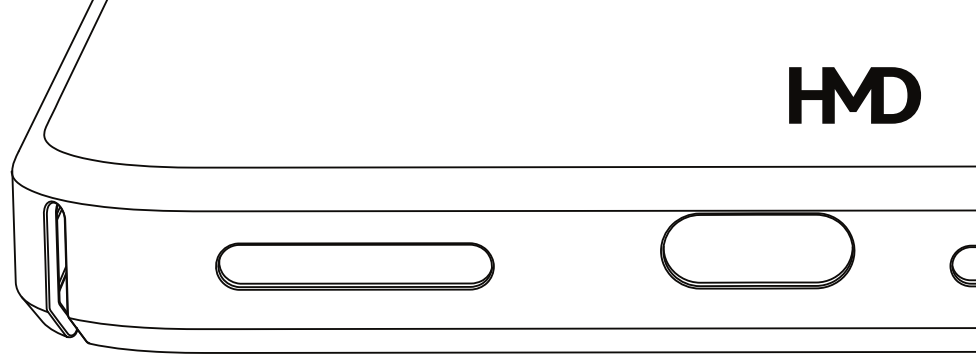




Google Developers: USB host and accessory overview

HAVE QUESTIONS?

GET IN TOUCH!



Questions about development?

For questions related to the design and development of HMD Fusion smart outfits we have a dedicated category on our HMD Discord server. Join us there to ask us questions and discuss with other members of the HMD community. Members of our HMD product design, hardware and software teams will help answer questions you have.

VISIT > >
the HMD Discord community

Business opportunity or commercial partnership?

We are super excited about the world of possibilities HMD Fusion opens up for the world as platform for innovation, and we hope you are too! If you're a business and you have an opportunity or commercial partnership in mind related to HMD Fusion, please get in touch. We're keen to explore commercial opportunities that show the potential of the platform.

SEND US > >
a contact request at HMD Solutions

What about brand collaborations?

Yes please! If you're a brand or agency representing brands and are interested in collaborations, we're eager to hear from you! We think HMD Fusion is a great fit for brand collaborations, bringing unique brand-specific concepts and use cases to life using our flexible platform.

GET IN TOUCH > >
about brand collaborations

HMD FUSION DEVELOPMENT TOOLKIT

TERMS OF USE

EFFECTIVE AS OF MARCH 3RD, 2025

These license terms form an agreement between HMD Global Oy ("HMD") and you. They apply to the HMD Fusion Development Toolkit (the "Toolkit") and the Reading ADC pin sample code (the "Code") included in the Toolkit. To use the Toolkit, you need to be at least 18 years of age. You understand and agree that use of the Toolkit is voluntary. HMD reserves a right to modify these terms from time to time.

a. LICENSE. Subject to your compliance with these license terms, you may use the Toolkit as specified in the instructions of the Toolkit for the purpose of designing, developing, and building smart outfits for the HMD Fusion device.

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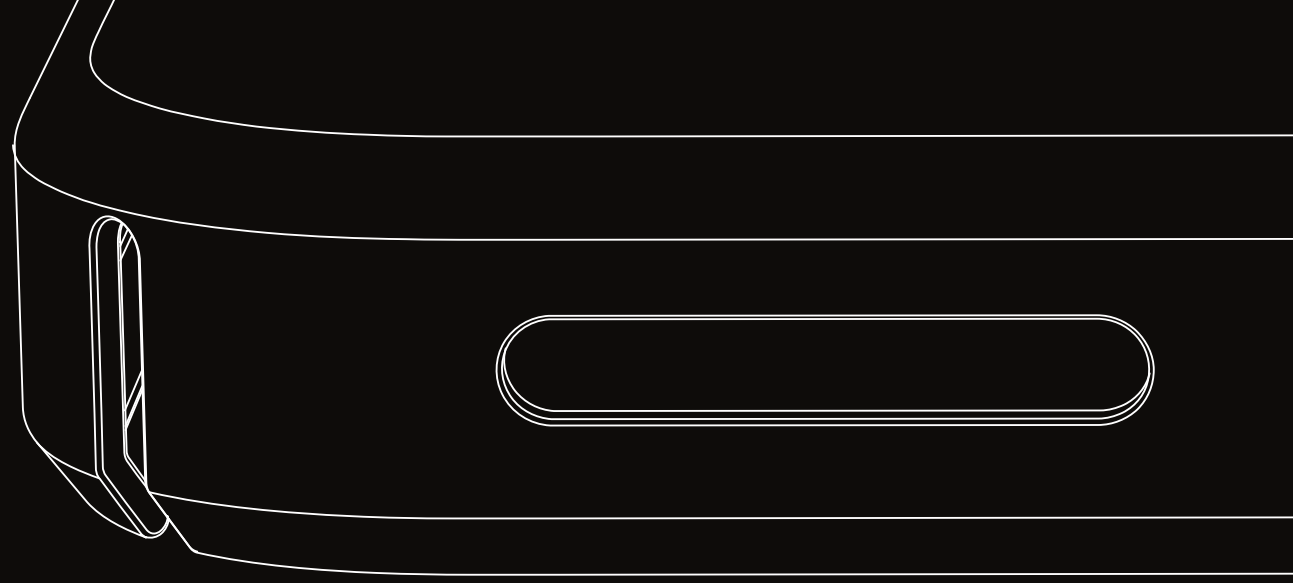

HUMAN MOBILE DEVICES

HMD