Case Design Guidelines for Apple Devices

Release R10
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1. Introduction

Note: These Case Design Guidelines for Apple Devices (‘Guidelines’) are subject to the terms and conditions set forth on the final page of this document. By downloading, accessing, or otherwise utilizing these Guidelines, you agree to be bound by, and only utilize the Guidelines in accordance with, such terms and conditions.

1.1 Purpose of This Specification

This document presents design guidelines for case accessories that are compatible with Apple devices.

1.2 Requirements and Recommendations

The use of the words must, must not, required, shall, shall not, should, should not, recommended, not recommended, may, optional, and deprecated in a statement have the following meanings:

- must, shall, or required means the statement is an absolute requirement.
- must not, shall not or prohibited means the statement is an absolute prohibition.
- should or recommended means the full implications must be understood before choosing a different course.
- should not or not recommended means the full implications must be understood before choosing this course.
- may or optional means the statement is truly optional, and its presence or absence cannot be assumed.
- deprecated means the statement is provided for historical purposes only and is equivalent to ‘must not’.
2. Cases

2.1 Product Design

A well-designed case will securely house an Apple device while not interfering with the device's operation. Significant factors in mechanical design include access to the device's sensors, controls, and connectors. The case developer should take into account the minimum and maximum dimensional tolerances of the Apple device(s) it claims compatibility with.

2.1.1 Device Layouts and Dimensions for Apple Devices

Cases must be designed to accommodate the full range of Apple device sizes within each product's dimensional variation. Dimensional drawings with tolerances for all Apple devices can be found in Device Dimensional Drawings (page 18).

2.1.2 Access to Controls

The case must readily permit the user to access and operate the device's mechanical controls such as, but not limited to:

- volume
- ring/silent controls
- sleep/wake control
- home button

2.1.3 Access to the Headset Jack and 30-pin or Lightning Connector

The case must provide ready access to an Apple device's headset jack. The headset jack opening must be at least 6.0 mm in diameter and at most 14.0 mm deep. At least 6.5 mm in diameter and at most 10.0 mm deep is recommended for best compatibility with a range of headsets.

The case must also provide unobstructed access to either the 30-pin connector or the Lightning connector.

If the case is for an Apple device with the Lightning connector, the opening must be at least 12.05 mm by 6.30 mm with full radii rounded edges. 13.65 mm by 6.85 mm is recommended for best compatibility with a range of cables and docks.
In addition, the headset jack and 30-pin or Lightning connector openings must be designed with enough margin to compensate for shifting or dimensional changes of the case material.

### 2.1.4 Access to the Smart Connector
Cases that do not make use of the Smart Connector must not expose it.

### 2.1.5 Device Protection
Cases must protect the Apple device from a 1 m drop onto a hard paved surface in any device orientation.

Specifically, exposed glass on the Apple device must not come within 1 mm of a flat surface, such as a table or floor, in any orientation when the case is attached. This may be achieved by either covering the exposed glass or creating features around it that will space the exposed glass at least 1 mm away from the flat surface.

### 2.1.6 Cover Glass Contact
Cases that claim compatibility with devices below should not contact the cover glass as defined in their dimensional drawings.

- iPhone 6s Plus
- iPhone 6s
- iPhone 6 Plus
- iPhone 6

See Device Dimensional Drawings (page 18).

### 2.1.7 Dock Compatibility
For compatibility with docks, the distance from bottom of the Apple device to the outside of a case should not exceed 1.8 mm.

### 2.1.8 Touchscreen
The case should permit water droplets to freely roll off the screen when the Apple device is held at a 30 degree angle relative to the horizon.

Cases must allow a 120° opening along the edges of the active area of the touchscreen to ensure compatibility with the Apple device touchscreen features. See Figure 2-1 (page 10) for more information on the keep-out and Device Dimensional Drawings (page 18) device specific active display areas.
2.2 Acoustics

The case must not impair or degrade the acoustical performance of an Apple device.

2.2.1 Speaker and Microphone Openings

When Apple devices have speakers or microphones, their locations may vary from model to model. Refer to the dimensional drawings for various Apple devices cited in *Device Layouts and Dimensions for Apple Devices* (page 8). The case must not obstruct the speaker or microphone ports.

2.2.2 Speaker to Microphone Coupling

The case must not facilitate the conduction of sound from the speaker to any microphone. Such sound conduction may cause echoing in phone calls.

2.2.3 Call Quality

The case must not impair or degrade the user’s experience making and receiving both audio calls over a cellular network or audio/video calls using Apple's FaceTime software. User testing must be conducted in all modes of operation (handset, speakerphone, and headset modes) supported by the Apple device, to confirm that the case does not change the loudness or frequency response of the speakers or microphones. In addition, the user must not be able to detect any sound distortion resulting from enclosing the Apple device in the case.
2.3 Sensors

Cases must be designed so they do not interfere with the operation of the sensors on an Apple device, such as:

- ambient light sensor
- magnetic compass
- proximity sensor
- accelerometer
- three-axis gyroscope

2.3.1 Ambient Light and Proximity Sensor Interference

The ambient light sensor and proximity sensor locations for various Apple devices are shown in the dimensional drawings cited in Device Dimensional Drawings (page 18). Some of the dimensional drawings specify a recommended keep-out area around these sensors. No material must be allowed to cover these sensors or their keep-out areas, this includes films and privacy screens. Cases that allow the Apple device to slide around must not obstruct any sensors.

2.3.2 Magnetic Interference

Apple recommends avoiding the use of magnets and metal components in cases.

Cases for Apple devices must not affect the device's built-in magnetic compass (if present).

Additionally, iPhone 6s Plus and iPhone 6 Plus have an autofocus rear camera equipped with optical image stabilization that may be affected by magnets and metal components in cases and rear camera accessories. Cases and rear camera accessories that claim compatibility with iPhone 6s Plus and iPhone 6 Plus must not affect operation of the autofocus rear camera.

2.3.3 Touch ID Sensor

Cases for Apple devices that are equipped with Touch ID must not inhibit the use of the device's Touch ID sensor. See Device Dimensional Drawings (page 18) for specific device keep-outs.

2.4 Camera

The field of view (FOV) of the camera and the illumination provided by the flash is designed for each Apple product. It is imperative that manufacturers consult technical specifications released for each product and do not assume these parameters are shared between products.
Images from the camera may be affected by the geometry, color and surface finish of the camera opening in the case.

### 2.4.1 Geometry

The camera lens FOV must not be blocked. Making the case opening around the camera too small may block the FOV of the lens. This may cause vignetting in the image, where the corners of are darker than the center. Blocking marginal rays just outside the FOV of the lens may also reduce the sharpness of the image. See Device Layouts and Dimensions for Apple Devices (page 8) for the detailed mechanical keep-out.

The case opening must not be designed in a way that directs stray light into the camera. If the opening is too narrow or too steep, it may reflect light into the camera, washing out the image or adding an unwanted color cast. Adding a chamfer to the case opening trim may help to direct stray light away from the camera. Additionally, where the product is equipped with a flash, a narrow or steep opening may reflect light from the case opening back into the camera or scene. This may cause the image to appear washed out or contain unwanted artifacts. Designers should ensure that the mechanical keep-outs outlined in the device dimensional drawings (Device Dimensional Drawings (page 18)) are maintained with worst-case X-Y placement tolerances.

### 2.4.2 Color

Any light reflected from the case may pick up the color of the case. Black material or black coating may help avoid color bleeding into the camera from an external light source or the flash. The darker the color, the less light may be reflected from the source into the camera.

| Note: | Apple recommends a semi-gloss black material or coating around the camera and flash opening. |

### 2.4.3 Surface Finish

The flash is a strong source of light and reflections from the camera case opening edge should be managed so they do not reflect back into the camera or the scene. Semi-gloss material may direct light away from the camera. Matte or diffuse materials scatter light in all directions and will increase the likelihood that light from the flash or strong sources in the scene is reflected into the camera.
2.4.4 Image Degradation Examples

Figure 2-2  Image degradation by color shifting

2.4.4.1 Contrast Decrease

Figure 2-3  Image degradation by decrease of contrast
2.4.4.2 Image Blocking

Figure 2-4  Image degradation by blocking

2.4.4.3 Flash Interference

Figure 2-5  Image degradation by flash interference

2.5 Reliability

Cases for Apple devices must be tested to verify that they will withstand long-term use under typical use conditions, and that they do not impair or degrade the functionality of the device, damage it or its immediate surroundings, or adversely affect the user.

2.5.1 Device Insertion and Removal

The case must hold the Apple device securely while permitting its easy insertion and removal. The case and the enclosed device must not be damaged by the repeated insertion and removal of the device from the case under conditions representative of long-term use in a variety of environments.
2.5.2 Colorfastness
Any dyes, inks, or coatings in or on the case must not bleed color onto either the device or its user, particularly while the case is in contact with common substances such as water or sunscreen.

2.6 Environmental
Cases for Apple devices must comply with applicable environmental regulations in the regions in which such cases are to be sold, and any applicable substance or material restrictions, including applicable restrictions on the following substances:

- organic tin compounds, PFOS, PFOA, phthalates, azo dyes, polybrominated biphenyls (PBBs) and PAHs, per requirements of the EU REACh regulation EC 1907/2006
- Nickel leach rate on surfaces in prolonged skin contact, per requirements of the EU REACh regulation EC 1907/2006
- Cadmium, lead, hexavalent chromium, and nickel, per requirements of EU Directive 2009/48/EC
- Natural rubber latex, per requirements of EU Directive EC 93/42/EEC
- Dimethylfumarate (DMFu), per requirements of EU Regulation 412/2012
- pH and Formaldehyde, per requirements of China GB 18401 for textiles and China GB 20400 for leather
- Endangered species of flora and fauna in products or packaging (US Lacey Act) Polybrominated diphenyl ethers (PBDE)

2.7 RF

2.7.1 Materials and Coatings
Cases for Apple devices must not contain materials or coatings that absorb radio frequency energy. Such materials may impair or degrade the performance of cellular communication antennas or GPS, Wi-Fi, or Bluetooth antennas. Examples include (but are not limited to) the following:

- Metals (e.g. steel, aluminum, magnesium, titanium, etc.)
- Plastics with any carbon content
- Plastics with any glass content
- Plastics with metallic plating
- Metallic paints
2.7.2 Near Field Communication (NFC)
Cases that claim compatibility with NFC enabled Apple devices must not degrade device NFC transaction performance. The following Apple devices are NFC enabled:

- iPhone 6s Plus
- iPhone 6s
- iPhone 6 Plus
- iPhone 6

2.8 Touchscreen
The touch interface in an Apple device senses the presence of one or more fingers on its surface. Any material between the surface and the user’s hand, even a very thin sheet of plastic, may affect the performance of the touch interface.

2.8.1 Overlay
If a case design requires the Apple device's touchscreen to be covered with an overlay, the overlay must not:

- exceed 0.3 mm in thickness
- introduce air gaps between the touchscreen and overlay
- be electrically conductive

2.8.2 Edge Swipe Gestures
A case must allow the user to easily use edge swipe gestures. These gestures include bringing up Control Center, Notification Center, and swiping back from apps that may use edge swipe gestures (such as the Messages app).
2.8.3 Edge Press Gestures

Cases that claim compatibility with iPhone 6s Plus or iPhone 6s must allow the user to easily use the edge press gesture. This gesture is used to bring up the task switcher in iOS 9.0 and later.
This chapter contains the following dimensional drawings:

- iPhone 6s Plus (page 21)
- iPhone 6s (page 22)
- iPhone 6 Plus (page 23)
- iPhone 6 (page 24)
- iPhone 5s (page 25)
- iPhone 5c (page 26)
- iPhone 5 (page 27)
- iPhone 4s (page 28)
- iPhone 4 (CDMA model) (page 29)
- iPhone 4 (GSM model) (page 30)
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- iPad Pro Wi-Fi (page 33)
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- iPad Air 2 Wi-Fi (page 37)
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- iPad mini 2 & 3 Wi-Fi (page 39)
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- iPad mini with Wi-Fi (page 43)
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- iPad with Wi-Fi (page 51)
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- iPod touch (6th generation) (page 53)
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3.2 iPhone 6s

Figure 3-2  iPhone 6s Dimensional Drawing
3.3 iPhone 6 Plus

Figure 3-3   iPhone 6 Plus Dimensional Drawing
3.4 iPhone 6

Figure 3-4  iPhone 6 Dimensional Drawing
3.5 iPhone 5s

Figure 3-5  iPhone 5s Dimensional Drawing
3.6 iPhone 5c

Figure 3-6  iPhone 5c Dimensional Drawing
3.7 iPhone 5

Figure 3-7  iPhone 5 Dimensional Drawing
3.8 iPhone 4s

Figure 3-8  iPhone 4s Dimensional Drawing
3.9 iPhone 4 (CDMA model)

Figure 3-9  iPhone 4 CDMA Dimensional Drawing
3.10 iPhone 4 (GSM model)

Figure 3-10  iPhone 4 GSM Dimensional Drawing
3.11 iPhone 3G and iPhone 3GS

Figure 3-11  iPhone 3G and iPhone 3GS Dimensional Drawing
3.12 iPhone

Figure 3-12  iPhone Dimensional Drawing
3.13 iPad Pro Wi-Fi

Figure 3-13  iPad Pro Wi-Fi Dimensional Drawing
3.14 iPad Pro Wi-Fi + Cellular

Figure 3-14  iPad Pro Wi-Fi + Cellular Dimensional Drawing
3.15 iPad mini 4 Wi-Fi

Figure 3-15  iPad mini 4 Wi-Fi Dimensional Drawing
3.16 iPad mini 4 Wi-Fi + Cellular

Figure 3-16  iPad mini 4 Wi-Fi + Cellular Dimensional Drawing
3.17 iPad Air 2 Wi-Fi

Figure 3-17 iPad Air 2 Wi-Fi Dimensional Drawing
3.18 iPad Air 2 Wi-Fi + Cellular

Figure 3-18  iPad Air 2 Wi-Fi + Cellular Dimensional Drawing
3.19 iPad mini 2 & 3 Wi-Fi

Figure 3-19  iPad mini 2 & iPad mini 3 Wi-Fi Dimensional Drawing
3.20 iPad mini 2 & 3 Wi-Fi + Cellular

Figure 3-20  iPad mini 2 & iPad mini 3 Wi-Fi + Cellular Dimensional Drawing
3.21 iPad Air Wi-Fi

Figure 3-21 iPad Air Wi-Fi Dimensional Drawing
3.22 iPad Air Wi-Fi + Cellular

Figure 3-22 iPad Air Wi-Fi + Cellular Dimensional Drawing
3.23 iPad mini with Wi-Fi

Figure 3-23 iPad mini with Wi-Fi Dimensional Drawing
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Figure 3-24  iPad mini Wi-Fi + Cellular Dimensional Drawing
3.25 iPad with Wi-Fi (4th generation)

Figure 3-25 iPad Wi-Fi (4th generation) Dimensional Drawing
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3.28 iPad with Wi-Fi + 4G (3rd generation)

Figure 3-28  iPad Wi-Fi + 4G (3rd Generation) Dimensional Drawing
3.29 iPad 2 with Wi-Fi

Figure 3-29  iPad 2 Wi-Fi Dimensional Drawing
3.30 iPad 2 with Wi-Fi + 3G

Figure 3-30  iPad 2 Wi-Fi + 3G Dimensional Drawing
3.31 iPad with Wi-Fi

Figure 3-31  iPad Wi-Fi Dimensional Drawing
3.32 iPad with Wi-Fi + 3G

Figure 3-32 iPad Wi-Fi + 3G Dimensional Drawing
3.33 iPod touch (6th generation)

Figure 3-33 iPod touch 6th gen. Dimensional Drawing
3.34 iPod touch (5th generation)
3.35 iPod touch (4th generation)

Figure 3-35  iPod touch 4th gen. Dimensional Drawing
3.36 iPod touch (3rd generation)

Figure 3-36  iPod touch 3rd gen. Fall '09 32GB and 64GB Dimensional Drawing
3.37 iPod touch (2nd generation)

Figure 3-37  iPod touch 2nd gen. 8GB, 16GB, 32GB Dimensional Drawing
3.38 iPod touch

Figure 3-38  iPod touch Dimensional Drawing
3.39 iPod nano (7th generation)

Figure 3-39  iPod nano 7th gen. Dimensional Drawing
3.40 iPod nano (6th generation)

Figure 3-40  iPod nano 6th gen. Dimensional Drawing
3.41 iPod nano (5th generation)

Figure 3-41 iPod nano 5th gen. Dimensional Drawing
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Figure 3-42   iPod nano 4th gen. Dimensional Drawing
3.43 iPod nano (3rd generation)

Figure 3-43  iPod nano 3rd gen. Dimensional Drawing
3.44 iPod nano (2nd generation)

Figure 3-44  iPod nano 2nd gen. Dimensional Drawing
3.45 iPod nano

Figure 3-45  iPod nano Dimensional Drawing
3.46 iPod classic 160GB

Figure 3-46  iPod classic 160GB Dimensional Drawing
3.47 iPod classic 80GB

Figure 3-47  iPod classic 80GB Dimensional Drawing
3.48 iPod (5th generation) 60GB/80GB

Figure 3-48  iPod 5th gen. 60GB/80GB Dimensional Drawing
3.49 iPod (5th generation) 30GB

Figure 3-49  iPod 5th gen. 30GB Dimensional Drawing
3.50 iPod (4th generation)

Figure 3-50  iPod 4th gen. Dimensional Drawing
3.51 iPod (3rd generation)

Figure 3-51  iPod 3rd gen. Dimensional Drawing
### 3.52 iPod photo 30GB/60GB

**Figure 3-52  iPod photo 30/60GB Dimensional Drawing**

<table>
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3.53 iPod photo

Figure 3-53  iPod photo Dimensional Drawing
3.54 iPod shuffle (4th generation)

Figure 3-54  iPod shuffle 4th gen. Dimensional Drawing
Figure 3-55  iPod shuffle 3rd gen. Dimensional Drawing
3.56 iPod shuffle (2nd generation)
3.57 iPod shuffle

Figure 3-57  iPod shuffle Dimensional Drawing (1 of 2)
Figure 3-58 iPod shuffle Dimensional Drawing (2 of 2)
3.58 iPod mini

Figure 3-59  iPod mini Dimensional Drawing
This table describes the changes to the Case Design Guidelines for Apple Devices.

<table>
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<th>Date</th>
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<tr>
<td>2015-09-10</td>
<td><em>Release R10</em>&lt;br&gt;Updated* Product Design (page 8)&lt;br&gt;Updated Sensors (page 11)&lt;br&gt;Updated Camera (page 11)&lt;br&gt;Updated Environmental (page 15)&lt;br&gt;Updated Near Field Communication (NFC) (page 16)&lt;br&gt;Updated Touchscreen (page 16)&lt;br&gt;Updated <em>Device Dimensional Drawings</em> (page 18): Added dimensional drawings for iPhone 6s Plus, iPhone 6s, iPad Pro, and iPad mini 4. Updated dimensional drawings for iPhone 6 Plus and iPhone 6</td>
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<td>2015-07-15</td>
<td><em>Release R9</em>&lt;br&gt;Added <em>Introduction</em> (page 7)&lt;br&gt;Added Touchscreen (page 9)&lt;br&gt;Updated <em>Device Dimensional Drawings</em> (page 18): Added dimensional drawings for iPod touch (6th generation)</td>
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<td>2014-10-16</td>
<td><em>Release R8</em>&lt;br&gt;Updated <em>Product Design</em> (page 8)&lt;br&gt;Updated Camera (page 11)&lt;br&gt;Updated Environmental (page 15)&lt;br&gt;Updated <em>Device Dimensional Drawings</em> (page 18): Updated dimensional drawings for iPhone 6 Plus and iPhone 6</td>
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### 4. Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Release</th>
<th>Changes</th>
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| 2014-09-10 |         | Updated **Device Dimensional Drawings** (page 18): Added dimensional drawings for iPad Air 2  
|            |         | Updated **Device Dimensional Drawings** (page 18): Renamed iPad mini with Retina display to iPad mini 2 and iPad mini 3  
| 2014-09-10 | Release R7 | Renamed 'Mechanical Requirements' to 'Product Design'  
|            |         | Updated **Access to the Headset Jack and 30-pin or Lightning Connector** (page 8)  
|            |         | Added **Device Protection** (page 9)  
|            |         | Added **Cover Glass Contact** (page 9)  
|            |         | Added **Dock Compatibility** (page 9)  
|            |         | Updated **Magnetic Interference** (page 11)  
|            |         | Updated **Touch ID Sensor** (page 11)  
|            |         | Updated **Environmental** (page 15)  
|            |         | Added **Near Field Communication (NFC)** (page 16)  
|            |         | Updated **Device Dimensional Drawings** (page 18): Added dimensional drawings for iPhone 6 Plus and iPhone 6  
| 2013-10-22 | Release R6 | Updated **Device Dimensional Drawings** (page 18): Added dimensional drawings for iPad mini 2 and iPad Air.  
| 2013-09-13 | Release R5 | Updated "1.1 Mechanical Requirements"  
|            |         | Updated **Sensors** (page 11)  
|            |         | Updated **Camera** (page 11)  
|            |         | Updated **Touchscreen** (page 16)  
|            |         | Updated **Device Dimensional Drawings** (page 18): Added dimensional drawings for iPhone 5s and iPhone 5c  
| 2013-05-08 | Release R4 | Updated "1.1 Mechanical Requirements"  
|            |         | Updated **Sensors** (page 11)  
|            |         | Updated **Camera** (page 11)  
|            |         | Updated **Touchscreen** (page 16)  
|            |         | Updated **Device Dimensional Drawings** (page 18): Added dimensional drawings for iPhone 5s and iPhone 5c  

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4. Revision History

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<td>2012-09-12</td>
<td>Release R3</td>
<td>Added information for devices with the Apple Lightning connector: iPhone 5, iPod touch (5th generation), and iPod nano (7th generation).</td>
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<td>2011-02-28</td>
<td>Release R1</td>
<td>First Release of &quot;iPhone Case Design Guidelines&quot;</td>
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Added **Device Dimensional Drawings** (page 18)
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