iTestMic2 USB-C

User Guide

Model SD2017

Studio Six Digital LLC

Professional Test & Measurement Microphone

V 1.0 — USB-C Edition

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Quick Start

iTestMic2 USB-C (Model SD2017) is a professional-grade test & measurement microphone for iPhone and iPad models that have a USB-C port. It connects to the attached iOS or iPadOS device using a digital audio link for the lowest noise and highest quality audio. iTestMic2 also has a 1/8" (3.5 mm) stereo line output.

iTestMic2 also works as a standard USB-C audio input device on Windows, Mac, and Android using the generic USB-C audio driver built into those operating systems. In those environments some features are reduced — see "Using iTestMic2 with Windows, Mac, and Android" below.

Hardware Requirements

iPhone and iPad models with a USB-C port — including iPhone 15 and later, and USB-C iPad, iPad Pro, iPad Air, and iPad mini models — running a current version of iOS or iPadOS. Also works with Mac, Windows, and Android devices, see section below.

App Compatibility

iTestMic2 is compatible with AudioTools, and many other iOS apps which record or process audio. While we have tested iTestMic2 with many apps and found that it works with many (including Apple's GarageBand), we cannot guarantee compatibility with all Apple or 3rd party apps. In particular, the Phone app on iPhone does not use external accessory audio, and will not work with iTestMic2.

Once iTestMic2 is plugged in, it will be active and immediately available to iOS as an audio source. There are no controls or setup required to make it function.

Installation

To install iTestMic2, plug it into the USB-C port of any compatible iOS or iPadOS device. Some third-party plastic outer cases have smaller openings for connector cables, so make sure that the case does not interfere with the iTestMic2 connector, and that the connector is fully seated in the USB-C port.

> **NOTE:** It takes approximately 3 seconds for iTestMic2 to be recognized by your device. So, if you plug iTestMic2 in while

AudioTools is running, wait for the confirmation box to appear before trying to use it.

App Installation

If you do not have the AudioTools app installed, when you connect iTestMic2 to your device a prompt may appear, and you may be asked if you want to install AudioTools. This behavior is normal and is a feature of iOS.

Calibration

You can use iTestMic2 right out of the box, since it automatically transmits its calibration values to the AudioTools app. This gives you an instantly usable acoustic analysis tool. To recalibrate it, or to check its calibration, see the section on Calibration, below.

NOTE: Automatic transfer of calibration values requires an iOS or iPadOS device running AudioTools. When iTestMic2 is used on Windows, Mac, or Android, auto-calibration is not available — see "Using iTestMic2 with Windows, Mac, and Android" below.

USB-C Connector Cable

The USB-C connector cable is used to attach iTestMic2 to your device. Connect it only to a compatible iPhone or iPad with a USB-C port. The cable should be connected to the device before starting AudioTools. Do not use unapproved extender cables or adapters. If you need to position the microphone away from your device, use only the Studio Six Digital tested extension cable — see "Extending iTestMic2 from Your Device" below.

Extending iTestMic2 from Your Device

In some measurement setups you may need to place iTestMic2 away from the device — for example, on a microphone stand or at a specific measurement point. Studio Six Digital offers an extension cable that has been specifically tested to work with iTestMic2; we have verified reliable operation at a length of 10 ft (3 m).

NOTE: For reliable operation, use only the Studio Six Digital tested extension cable. Other extension cables, adapters, or hubs are not approved and may not pass the digital audio and power signals correctly, which can result in dropouts or the microphone not being recognized.

Line Output Connector

iTestMic2 features a 1/8" (3.5 mm) stereo line output connector. Note that this output is always at full volume, and does not respond to level changes from the iOS device. In the AudioTools app, there are some modules which can alter the output level of the signal going to iTestMic2.

> **NOTE:** This output is not designed for headphones and may produce excessive volume levels to some headsets or headphones.

Powering Your Device While Using iTestMic2

iTestMic2 draws its power from the attached device and does not itself supply charging power. For extended measurement sessions where you need to keep the device charged while the microphone is connected, use the Studio Six Digital power splitter cable. This accessory connects to your device's USB-C port and provides both the iTestMic2 connection and a USB-C power input, so a charger or power bank can keep the device charged while iTestMic2 remains in use.

> **NOTE:** Use only the Studio Six Digital power splitter cable for simultaneous power and microphone connection. Connect a standard USB-C power source to the cable's power input; the device will charge while iTestMic2 continues to operate normally.

AudioTools App

iTestMic2 is designed to work with the Studio Six Digital app "AudioTools", which is available for download on the App Store. When used with AudioTools, all of the features of iTestMic2, such as multiple gain ranges and output configuration, are available. When used with any other app, iTestMic2 operates in the configuration specified on the Settings → Configuration Settings screen of AudioTools.

This manual will not cover the AudioTools app in detail, but it will discuss some of the ways in which AudioTools interacts with iTestMic2.

Line Output Mode (Mono / Balanced)

The 1/8" (3.5 mm) stereo line output can operate in either Mono or Balanced mode, selected in AudioTools' output configuration. The correct mode depends on the cable you are using and the type of input

you are feeding, so set it to match your connection before relying on the output.

- Balanced mode — use when you connect iTestMic2 to a balanced input with a balanced cable. The two conductors carry the signal as a balanced (differential) pair, which rejects noise and is preferred for longer cable runs.
- Mono mode — use when you connect iTestMic2 to a standard stereo (unbalanced) input. Both output signals are sent in phase, so the destination receives a consistent mono signal rather than a differential pair.

> **NOTE:** Match the mode to your cable and destination: a balanced cable going into a balanced input requires Balanced mode, while a cable going into a stereo (unbalanced) input should use Mono mode — both signals in phase. Selecting the wrong mode can cause partial signal cancellation or unexpected output levels.

Acoustic Analysis and SPL Functions

These functions use the input source selected and gain range settings on the Settings menu, Microphone Setup module. The currently active input source is always shown on the screen. You may see labels like "iTestMic2 Mic Low Range" or "iTestMic2 Line High Range".

SPL Meter

SPL Meter gives you a way to accurately measure Sound Pressure Levels with iTestMic2. SPL Meter uses ANSI / ISO Type 1 filters for A and C weighting, as well as exponential decay characteristics. Needle dynamics are carefully matched to real analog meter ballistics. Range may be set from 40 dB to 140 dB to measure sound levels over a wide range.

RTA

Use the Real Time Analyzer to display levels for each frequency band. You can view the display in octave or 1/3 octave mode, display a cursor to read out actual levels, and see max and min values. Graphs may be saved and recalled, or exported for reports or further analysis.

FFT

The FFT module performs a high-resolution Fast Fourier Transform analysis of the incoming signal, showing fine frequency detail with

selectable resolution. It is well suited to identifying discrete tones, harmonics, and narrow-band content that broader analyzers such as the RTA may average together, making it useful for troubleshooting noise sources and characterizing individual frequency components.

LARSA

LARSA is a real-time spectrum analyzer designed for room and sound-system measurement. It uses long-term, log-frequency averaging to build a stable, smoothed spectrum over time, which is more meaningful than an instantaneous display when equalizing and tuning a system. Because the averaged response settles out short-term fluctuations, LARSA is a good choice for setting overall system response in a room.

Transfer Function

The Transfer Function module measures the frequency response of a system under test — both magnitude and phase — by comparing a measured signal to a known reference. iTestMic2 is well suited to this measurement because its line output can provide that reference. AudioTools generates a test signal (such as pink noise or a swept sine), sends it out the iTestMic2 line output and into the system under test, and — because the app generates the signal itself — retains an internal copy to use as the reference. The microphone then captures the system's actual output, and comparing the two reveals how the system alters the signal in level and timing across frequency.

> **NOTE:** For accurate magnitude and phase results, drive the system under test from the iTestMic2 line output so the reference and measurement stay synchronized, and set the output mode (Mono or Balanced) to match the input you are feeding — see "Line Output Mode (Mono / Balanced)" above.

Using iTestMic2 with Windows, Mac, and Android

In addition to iPhone and iPad, iTestMic2 works as a standard USB-C audio input device on Windows, macOS, and Android. It uses the generic USB-C audio driver built into those operating systems, so no special driver installation is required — simply connect the microphone and select it as the audio input device in your operating system or application.

Because these platforms communicate with iTestMic2 through the generic audio driver rather than the iOS accessory link, two features that depend on that link are not available:

- The two gain ranges cannot be selected. On Windows, Mac, and Android the microphone operates in a fixed Low Range (high gain). See "Understanding the Two Gain Ranges" for what this means for headroom and noise floor.
- Automatic calibration is not available. The microphone's stored calibration values are not transferred to the host, so readings are not automatically calibrated as they are with AudioTools on iOS.

Using AudioTools on Mac

AudioTools is available for Mac and works with iTestMic2, but the microphone must first be selected as the system audio input. Open System Settings → Sound (System Preferences → Sound on older versions of macOS), choose the Input tab, and select iTestMic2 as the input device. Then launch AudioTools.

> **NOTE:** As with the other computer platforms, when used on Mac the microphone operates in the fixed Low Range and does not auto-calibrate. Choose the input level of your source accordingly to avoid overload, and apply calibration manually if precise absolute levels are required.

Understanding the Two Gain Ranges

iTestMic2 has two selectable input gain ranges — Low Range and High Range — that together let a single microphone cover a very wide span of sound levels while preserving measurement accuracy. Internally, the microphone signal is presented to the converter on two separate paths: the Low Range path applies high gain, and the High Range path applies no additional gain. AudioTools selects the appropriate path for you when you choose a range, and the calibration trim values for both ranges are stored in the microphone's non-volatile memory, so each range stays accurately calibrated.

You select the active range in AudioTools under Settings → Microphone Setup, or in any module, from the Settings page, tap the mic icon. The currently active source and range are always shown on the measurement screen (for example, "iTestMic2 Mic Low Range").

> **NOTE:** Selectable gain ranges are available only when iTestMic2 is connected to an iPhone or iPad running AudioTools. On Windows, Mac, and Android the microphone operates in a fixed Low Range and the range cannot be changed — see "Using iTestMic2 with Windows, Mac, and Android".

How the Two Ranges Differ

The two ranges trade noise performance against headroom. Low Range adds gain ahead of the analog-to-digital converter, which lifts quiet signals well above the system's noise floor — ideal for measuring faint sounds — but that same gain means loud sounds reach digital full scale (clipping) sooner. High Range applies no added gain, so it can accept much louder sounds before clipping, at the cost of a higher effective noise floor that leaves very quiet signals sitting closer to the noise.

Characteristic	Low Range (high gain)	High Range (no gain)
Best suited for	Quiet to moderate sound levels	Loud sound levels and high-SPL sources
Input gain	High gain applied ahead of the ADC	Unity / no added gain
Noise floor	Lowest effective noise floor; best for faint signals	Higher effective noise floor; faint signals sit closer to noise

Characteristic	Low Range (high gain)	High Range (no gain)
Headroom	Limited — loud transients can overload and clip	Maximum headroom before clipping
Typical use	Room noise, HVAC, background levels, low-level measurements	Live music, machinery, alarms, impulsive or high-SPL events

Choosing the Right Range

As a rule of thumb, use Low Range for quiet to moderate environments and low-level measurements, where a clean noise floor matters most. Use High Range for loud sources and high-SPL events, where avoiding overload matters most. Because AudioTools reports levels in dBFS using the AES standard (a sine wave just reaching clipping reads 0.00 dBFS, and a square wave would read +3.00 dBFS), you can watch the on-screen level to confirm you have chosen a range with adequate headroom.

If you are not sure which range to use for a given source, start in High Range to be safe from clipping, then switch to Low Range only if the signal is well below full scale and you need a cleaner reading of the quiet detail. After choosing a range it is good practice to check your headroom in the Audio Scope (Line Input → Audio Scope, set to Mono / Input Source Mic) and confirm the waveform is not clipped.

Tradeoffs at a Glance

- Low Range gives you the best signal-to-noise ratio and resolution on quiet material, but the least headroom — loud transients can overload it.
- High Range gives you the most headroom for loud material and high-SPL events, but a higher effective noise floor, so very quiet detail is less distinct.
- There is no single "best" range: the correct choice depends on the loudness of the sound you are measuring. Matching the range to the source is what preserves both accuracy and dynamic range.

Limitations

- Only one range is active at a time. iTestMic2 does not capture both ranges simultaneously, so you cannot get a single measurement that combines the low-noise floor of Low Range with the headroom of High Range.
- Range selection is manual and is not automatic. If Low Range is left selected for a loud source, the signal will clip and the reading will be invalid; if High Range is left selected for a very quiet source, the reading may be dominated by the noise floor.
- Selectable gain ranges are a feature of AudioTools on iOS and iPadOS. When iTestMic2 is used with a third-party iOS app, it operates in the single fixed configuration set on the Settings → Configuration Settings screen of AudioTools, and the range cannot be changed from within the other app. On Windows, Mac, and Android the microphone is fixed in Low Range and neither range selection nor auto-calibration is available.
- Each range carries its own calibration trim. If the microphone is exposed to extremes of heat, cold, or humidity and its calibration drifts, both Low Range and High Range should be checked and, if necessary, recalibrated and re-stored.
- Neither range extends the microphone's overall capability beyond its rated span. The complete measurement window is still bounded by the microphone's rated range of 28 dBA – 120 dBA and by the converter's full-scale limit; the two ranges simply position the usable window optimally for quiet versus loud sources.

Calibration

iTestMic2 is factory-calibrated at 94.0 dB at 1 kHz, ± 0.1 dB. The high and low range trim values are stored in the mic in non-volatile memory, so that when iTestMic2 is plugged into AudioTools, the calibration factors are read by the app, giving you a ready-to-use calibrated system. You don't have to do anything to store these values; they are read every time that AudioTools detects iTestMic2.

iTestMic2 will typically hold its calibration within a fraction of a dB, but if exposed to extremes of heat, cold, or humidity, the microphone calibration may change. At any time, you can check the calibration using an SPL calibrator, and if necessary adjust the trim values and store them back into iTestMic2. These instructions are below.

Microphone Calibration with a Calibrator

Before beginning calibration, connect iTestMic2 to your device. Now start the AudioTools app and go to the Settings menu, Microphone Setup function. The Input Sources screen appears. Select the first calibration option, by tapping the blue disclosure triangle for the first entry on the top of the screen.

> **NOTE:** AudioTools uses the AES standard for dBFS, which is that for a sine wave just reaching clipping, the reading will be 0.00. A square wave would by this formula show +3.00 dBFS.

Select Low Range. Now enter the calibrator output setting (typically 94) in the dB field by tapping on the field, clearing the value in the field, and entering your calibrator's fixed value. Tap Done. The trim value will be set automatically by this process, so do not alter it.

Select High Range, and repeat the calibration process. Now, you should be able to switch back and forth between Low and High range, and the dB value should stay the same. When you have completed setting the calibration trim values, tap the button "Store Calibration in iTestMic2". Accept the confirmation screen. Now the new calibration is stored in the microphone, and will be available to any device that is running AudioTools.

After setting the ranges, it's a good idea to double check your headroom using Audio Scope. To do this, exit this screen, and go to the Line Input menu, Audio Scope screen. Go to settings (tap the wrench icon), and select Line Input Mode Mono, Input Source Mic. Now go back to the scope screen and check that the sine wave is not clipped.

Microphone Calibration by Matching

If you do not have access to a microphone calibrator, but you do have access to a calibrated SPL meter, you can do basic calibration by matching iTestMic2 to the SPL meter. Since iTestMic2 comes calibrated from the factory, we do not normally recommend doing this procedure. To do this, follow the instructions above, with these changes:

- Use an acoustic noise source such as pink noise, or white noise. White noise will have less low frequency, and may be a better choice, since it is best to calibrate with mid-band energy. Do not use a sine wave signal, because you may get cancellation or reinforcement effects that can throw off the readings.
- Use A Weighting, if possible, with the calibrated meter.
- Enter the value read from the calibrated SPL meter into the dB field in AudioTools.

Specifications

All specifications are subject to change.

Microphone

- 28 dBA – 120 dBA
- Frequency Response 20 Hz – 20 kHz, ± 3.0 dB
- 1/2" nominal diameter, fits standard calibrators
- Consumes less than 90 mA in use
- Omnidirectional

Line Output

- Stereo output
- Output level @ 10k Ohm load: +9.0 dBu or 2.1 Vrms
- Distortion at 1 kHz less than 0.010%

Support

See our website for the most up-to-date information about our products.

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