



# ConnectCore MP25 Performance and Power

## Benchmarking Report

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Application Note

## Revision history—90002649

| Revision | Date       | Description                                  |
|----------|------------|----------------------------------------------|
| A        | March 2026 | Initial release.                             |
| B        | April 2026 | Correct instrumentation model specification. |

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For more information

## Introduction

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This document characterizes power consumption and performance for the ConnectCore MP25 SOM. It includes detailed measurements representing a variety of use cases and includes performance tests for key interfaces, including CPU, memory, Wi-Fi, and audio playback.

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**Note** This information is provided as a reference on the capabilities of the ConnectCore MP25 platform. You may see different figures due to software or other factors.

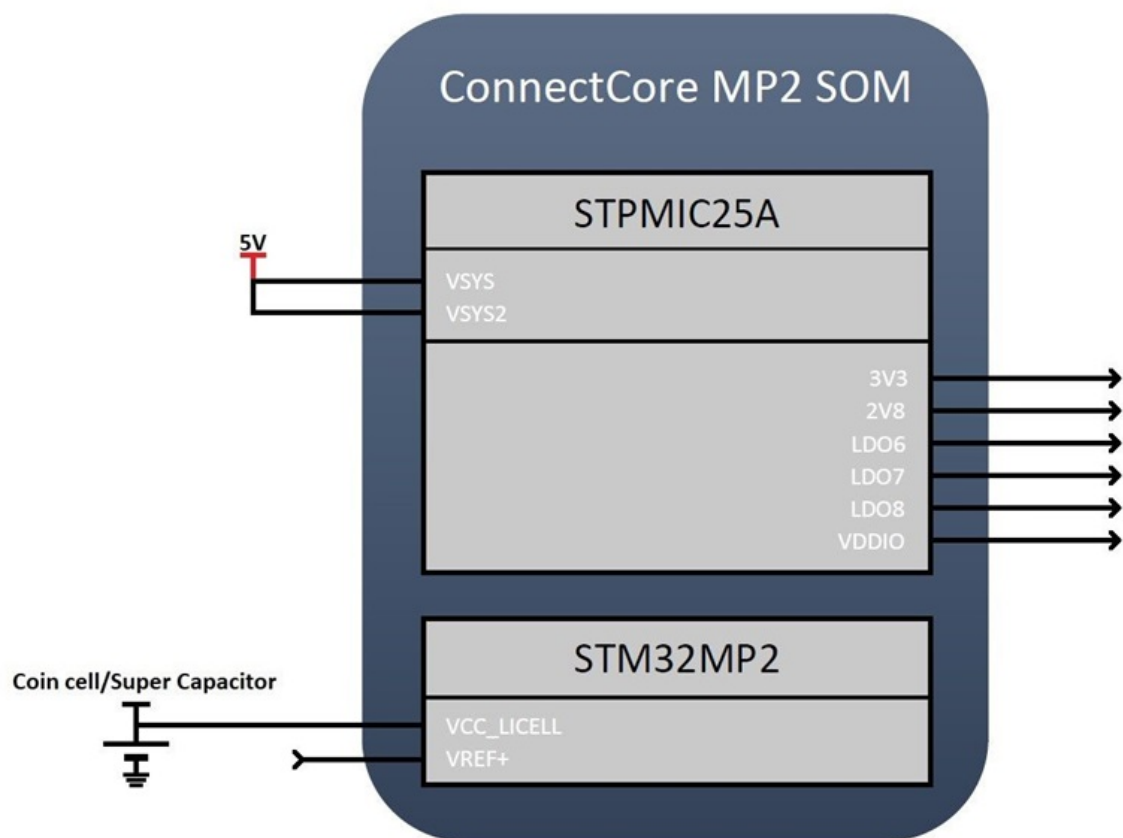
---

## Power architecture

The following diagram represents the full power architecture distribution of the ConnectCore MP25 module with its two main components:

- The STPMIC25APQR PMIC
- The STM32MP255 SOC

The following diagram shows a typical application:



## Input power supplies

The ConnectCore MP25 requires two primary power supply inputs:

- VSYS
- VSYS2

VSYS and VSYS2 are the input power supplies to the on-module STPMIC25APQR Power Management IC (PMIC), as well as to most of its regulators.

Some PMIC regulators are internally dedicated to powering the module, while others power external circuitry.

## PMIC output supplies

The PMIC generates many power rails. Most are used internally in the SOM. Some are also used externally:

| PMIC power rails | Used internally | Used externally | Comments                        |
|------------------|-----------------|-----------------|---------------------------------|
| 1V8              | Yes             | Yes             | General purpose 1.8V power rail |
| 3V3              | Yes             | Yes             | General purpose 3.3V power rail |
| VDDCPU           | Yes             | No              |                                 |
| VDDCORE          | Yes             | No              |                                 |
| VDDGPU           | Yes             | No              |                                 |
| VDDIO            | Yes             | No              |                                 |
| VDD_DDR          | Yes             | No              |                                 |
| VDD3V3_USB       | Yes             | No              |                                 |

For additional information about the power architecture of the module, see the [ConnectCore MP25 Hardware Reference Manual](#).

## Measurement conditions

---

### Hardware used

The following hardware was used for the measurements:

- ConnectCore MP25 SOM:
  - Variant 0x01: 1 GiB DDR4, Wi-Fi, Bluetooth
  - PN: 55002225-01
- ConnectCore MP25 DVK:
  - PN: 55002225-01

### Software used

#### Digi Embedded Yocto

The software used on the devices is the pre-built installer binary image for Digi Embedded Yocto 5.0-r3 release, available on the [Digi support site](#) (md5sum: c57f1f5e186fed8c5e2f15f046cde92)

To install the firmware, visit the [documentation portal for your platform](#) and follow the Get Started process.

After installing the firmware you can run **sysinfo** to verify the component versions:

| Component | Version                 |
|-----------|-------------------------|
| U-Boot    | U-Boot dub-2023.10-r3.2 |
| Firmware  | dey-5.0-r3              |
| Kernel    | 6.6.78                  |

#### Benchmark packages

A few additional packages with benchmark tools have been built and must be installed on the device after programming the firmware. Download these tools from the [Digi FTP server](#).

| Package   | Description                                                                                                                      |
|-----------|----------------------------------------------------------------------------------------------------------------------------------|
| coreutils | A set of system commands with more extended options than the ones in Busybox. The tests use the coreutils version of <b>dd</b> . |
| coremark  | CPU benchmark application (executable binary).                                                                                   |
| glmark2   | GPU benchmark application.                                                                                                       |
| iozone3   | File system benchmark application.                                                                                               |
| iperf3    | Network interfaces benchmark application.                                                                                        |

Copy pre-built binary **coremark** directly to **/usr/sbin** on the target and give the application execution permissions.

---

```
~# chmod 755 /usr/sbin/coremark
```

---

## Host requirements

For the network tests, your host system needs to have the **iperf3** tool. To install it:

---

```
~$ sudo apt-get install iperf3
```

---

## General conditions

### Location and environment

The power consumption and benchmark tests have been carried out at room temperature of 22°C, 30% humidity.

The target sits on a table with no enclosure.

## Instrumentation

The following instruments were used during the tests:

| Qty | Instrument                 | Model                   | Details |
|-----|----------------------------|-------------------------|---------|
| 1   | Keysight DC Power Analyzer | N6705C                  | 5V / 3A |
| 1   | Multimeter                 | FLUKE 8846A 6-1/2 Digit |         |
| 2   | Multimeter                 | FLUKE 289 True RMS      |         |

## SOM power measurements

### How to calculate SOM power

As depicted in the [Power architecture](#) diagram, current flows into the SOM through VSYS, VSYS2.

Some of the PMIC output power supplies flow **out** of the SOM to power external circuitry, namely the 3V3\_SOM (PMIC BUCK7) and 1V8\_HDMI (PMIC LDO7) power rails. The power on these two points must be subtracted from the total input power to estimate the power solely consumed by the SOM. Other power domains are ignored because the power consumption on those rails is almost 0.

### Measurement points

The ConnectCore MP25 DVK has several 0-ohm resistors to perform power consumption calculations.

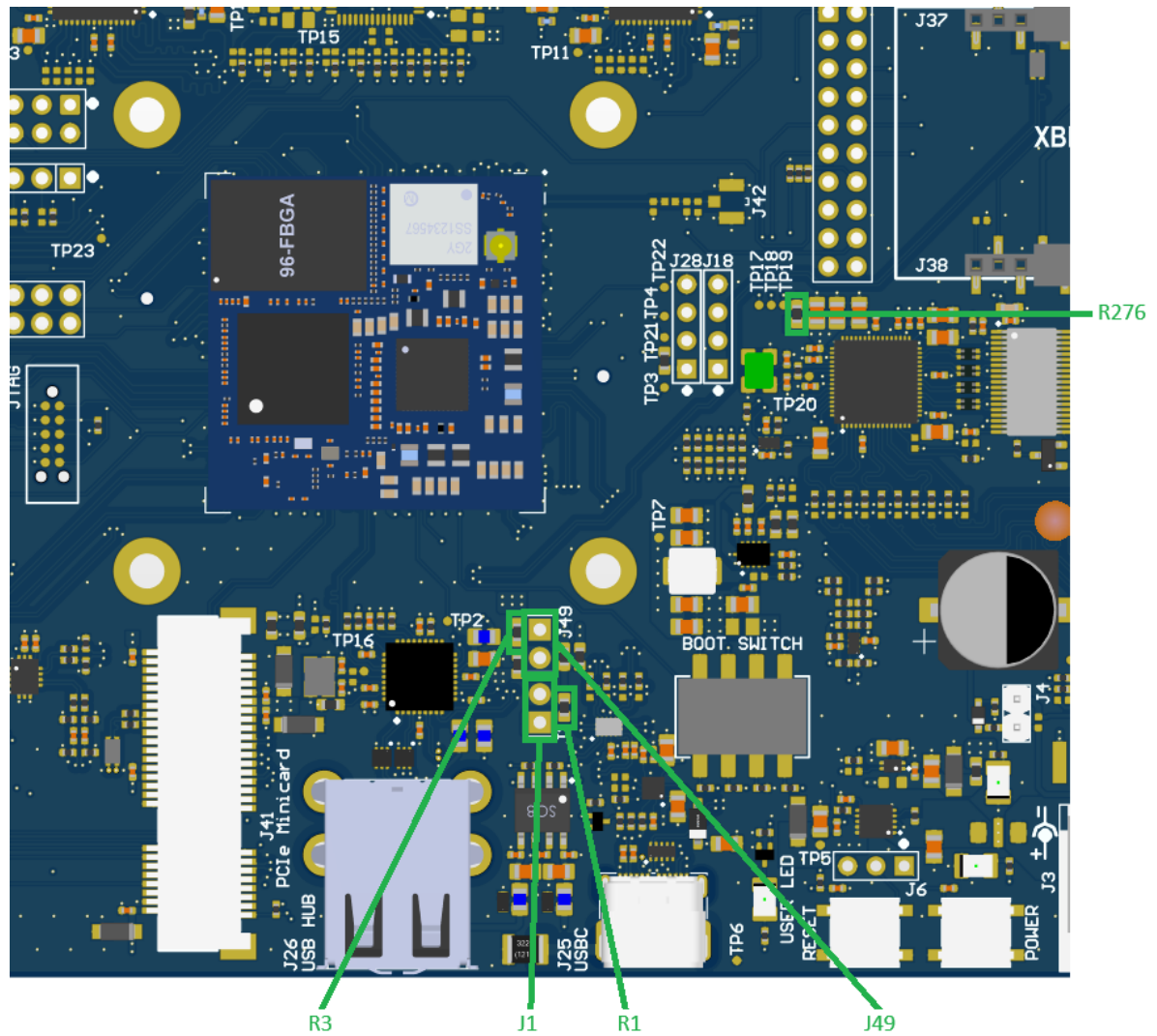
1. Remove R1, populate J1 and wire it to an ammeter to measure the current flowing **in** through VSYS and VSYS2. Measure the voltage at this point too (~5V) to calculate the power more accurately.
2. Remove R3, populate J49 and wire it to an ammeter to measure the current flowing **out** through 3V3\_SOM. Measure the voltage at this point too (~3.3V) to calculate the power more accurately.
3. Remove R276 and wire it to an ammeter to measure the current flowing **out** through 1V8\_HDMI. Measure the voltage at this point too (~1.8V) to calculate the power more accurately.

| Power | Measuring point | Power rail   | Voltage | Direction with respect to SOM |
|-------|-----------------|--------------|---------|-------------------------------|
| P1    | J1              | VSYS + VSYS2 | 5V      | In                            |
| P2    | J49             | 3V3_SOM      | 3.3V    | Out                           |
| P3    | R276            | 1V8_HDMI     | 1.8     | Out                           |

### Formula

SOM power consumption is estimated as:  $P_{SOM} = P1 - P2 - P3$

## Resistor location on the ConnectCore MP25 DVK



## Use cases

---

Digi measured power consumption of the ConnectCore MP25 SOM in the following use cases:

- Low-power modes
  - Power-off
  - Suspend to RAM
  - System idle
- Active modes (such as I/O, video, audio, camera, network interfaces)

---

**Note** This chapter presents the power measurements for the low-power modes.

The next section, containing the performance benchmarks for different tests, presents the power measurements for the active modes beside each benchmark score.

---

## Low-power modes

### Power-off

To enter power-off mode, press the ON/OFF button of the carrier board for more than five seconds, or run:

---

```
~# poweroff
```

---

| Mode     | SOM power |
|----------|-----------|
| Poweroff | 11.7 mW   |

### Suspend to RAM

To enter standby mode, press the ON/OFF button of the carrier board once, or run:

---

```
~# standby
```

---

In this mode, the system suspends to RAM and operation can be resumed without doing a new boot cycle. RAM memory is in self-refresh mode.

| Mode           | SOM power |
|----------------|-----------|
| Suspend to RAM | 43 mW     |

## System idle

In this use case, the system is running Digi Embedded Yocto graphical image with standard daemons and a graphical desktop over HDMI interface.

| Mode        | SOM power |
|-------------|-----------|
| System idle | 1412.2 mW |

## RTC

System on RTC (using internal CPU real-time clock) mode keeping the time of the system, powered from a coin-cell with no other power supply attached.

| Mode     | SOM power |
|----------|-----------|
| Poweroff | 70 uW*    |

\* To achieve this result, the device must be configured to operate in the deepest power mode, with all unnecessary wake-up sources disabled.

## Active modes

Refer to the [Performance tests](#) section for the power measurements in different active mode use cases such as video playback and recording, Wi-Fi activity, or intensive I/O transfers.

## Performance tests

---

### CPU

#### CoreMark

CoreMark is a benchmark tool specifically designed to test the functionality of a processor core. The test produces a single-number score in iterations per second.

#### Command

```
~# coremark
```

#### Results

| Test     | Score | Metric  | SOM power |
|----------|-------|---------|-----------|
| CoreMark | 6888  | iter./s | 1635 mW   |

### Memory

#### perf-bench

**perf-bench** is a tool used to exercise and benchmark the RAM of the SOM.

Here is a command breakdown of the arguments:

#### Command: memset

```
~# perf bench -f simple mem memset -s 380MB
```

#### Command: memcpy

```
~# perf bench -f simple mem memcpy -s 190MB
```

#### Results

| Test       | DDR density | Operation | Score   | Metric | SOM power |
|------------|-------------|-----------|---------|--------|-----------|
| perf-bench | 1 GB        | memset    | 2545.95 | MB/s   | 1884 mW   |
|            |             | memcpy    | 1173.86 | MB/s   | 1918 mW   |

## Storage media

### IOzone3

IOzone3 is a file system benchmark tool that generates and measures a variety of file operations. The following tests measure the filesystem performance on different media and interfaces:

- NAND (ubifs)
- microSD card (ext4)
- USB 2.0 (ext4)
- USB 3.0 (ext4)

### Command

```
~# cd <mount-point-of-test-media>
~# iozone -i 0 -i 1 -b /tmp/iozone.xls -r 128k -s 2G -l 1 -u 1
```

The test:

- Runs write/rewrite (-i 0)
- Runs read/reread (-i 1)
- Uses a record size of 128k (-r 128 k)
- Uses a file size of 2 GB (-s 2 G)
- Runs on a single core (-u 1)

### Results

| Test    | Media        | Media model/density                            | Operation | Score  | Metric | SOM power |
|---------|--------------|------------------------------------------------|-----------|--------|--------|-----------|
| IOzone3 | eMMC *       | 8 GB                                           | Read      | 145.48 | MB/s   | 1746 mW   |
|         |              |                                                | Write **  | 32.82  | MB/s   |           |
| IOzone3 | microSD card | Kingston microSD HC1                           | Read      | 21.04  | MB/s   | 1626 mW   |
|         |              |                                                | Write     | 18.59  | MB/s   |           |
| IOzone3 | USB 2.0      | Transcend Information, Inc. JetFlash 16 GB 2.0 | Read      | 33.93  | MB/s   | 1760 mW   |
|         |              |                                                | Write     | 30.46  | MB/s   |           |

\* Only 900 MB available to perform the test.

\*\* These values may vary depending on the specific eMMC device used.

## Ethernet

### Environment conditions

- Ethernet cable: 3 m CAT6 patch cable
- Gigabit switch model: D-Link DGS-108
- 10/100 switch model: D-Link DES-1008D

### iPerf3

iPerf3 is a tool for active measurements of the maximum achievable bandwidth on IP networks.

#### Command (host)

```
~# iperf3 -s
```

#### Command (target)

```
~# iperf3 -c <server ip>
```

### Results

| Test   | Interface | Network | Score<br>send/receive | Metric    | SOM power |
|--------|-----------|---------|-----------------------|-----------|-----------|
| iPerf3 | ETH0      | Gigabit | 942/938               | Mbits/sec | 1666 mW   |

### FTP

FTP is a protocol for file transfer over the network.

#### Command (target)

On the target side, allow access to user **root** (forbidden by default):

```
~# sed /root/d -i /etc/vsftpd.ftpusers
```

Generate a 1 GB file with random data.

```
~# dd bs=1M count=1024 if=/dev/urandom of=testfile && sync
```

#### Command (host): GET

On the host side, connect to the target via FTP (user: root, without pass) and get the file:

```
~$ ftp -p <target_ip_address>
ftp> get testfile
```

**Command (host): PUT**

Send the file to the target

---

```
ftp> put testfile
```

---

**Results**

| Test   | Interface | Network | Operation            | Score  | Metric | SOM power |
|--------|-----------|---------|----------------------|--------|--------|-----------|
| iPerf3 | ETH0      | Gigabit | GET (target to host) | 106.33 | MiB/s  | 2026 mW   |
|        |           |         | PUT (host to target) | 35.36  | MiB/s  | 1906 mW   |

## Wi-Fi

**Environment conditions**

- Antennas connected to U.FL connector
- Access point model: Cisco Catalyst 9115AX
- Distance from target to access point: 2 m (with no obstacles in between)

**iPerf3**

iPerf3 is a tool for active measurements of the maximum achievable bandwidth on IP networks.

**Note** Wi-Fi performance is subject to many variables which are difficult or impossible to control, such as the electromagnetic radiation present in the place where the test is carried out, the channel used for the test, etc.

This test was not performed in an isolated chamber.

**Setup**

To measure the performance of the wireless interface, Digi set up two scenarios: one with the target working in station mode (the target is connected to an access point), and other scenario as AP (the target is acting as an access point)

**Station**

The target is connected to an access point. The setup requires an auxiliary device (host) connected to the same network as the access point. Ideally, the auxiliary device is connected to the access point using a Cat6 cable.

**Soft-AP****Command (host)**


---

```
~# iperf3 -s
```

---

**Command (target)**


---

```
~# iperf3 -c <server ip>
```

---

**Results**

| Test   | Mode    | Band                  | Score send /receive | Metric    | SOM power |
|--------|---------|-----------------------|---------------------|-----------|-----------|
| iPerf3 | Station | 2.4 GHz (802.11b/g/n) | 36.8/36.1           | Mbits/sec | 2055 mW   |
|        |         | 5 GHz (802.11ac)      | 72.1/71.2           | Mbits/sec | 2411 mW   |

**FTP**

FTP is a protocol for file transfer over the network.

**Command (target)**

On the target side, allow access to user **root** (forbidden by default):

---

```
~# sed /root/d -i /etc/vsftpd.ftpusers
```

---

Generate a 1 GB file with random data.

---

```
~# dd bs=1M count=1024 if=/dev/urandom of=testfile && sync
```

---

**Command (host): GET**

On the host side, connect to the target via FTP (user: root, pass: root) and get the file:

---

```
~$ ftp -p <target_ip_address>
ftp> get testfile
```

---

**Command (host): PUT**

Send the file to the target:

---

```
ftp> put testfile
```

---

**Results**

| Test | Band                  | Score     | Metric | SOM power |
|------|-----------------------|-----------|--------|-----------|
| FTP  | 2.4 GHz (802.11b/g/n) | 1.46/2.69 | MiB/s  | 1931 mW   |
|      | 5 GHz (802.11ac)      | 2.51/4.45 | MiB/s  | 2086 mW   |

## GPU

### Environment conditions

- Full screen

### Glmak2

Glmak2 runs a series of tests, rendering different kinds of 2D and 3D graphics and animations on the screen and then measures the output performance in terms of frames per second (fps). It then averages the fps across all the tests to calculate a score for the GPU.

### Command

---

```
~# glmark2-es2-wayland --fullscreen
```

---

### Results

| Test   | Resolution  | Interface | Score | Metric       | SOM power |
|--------|-------------|-----------|-------|--------------|-----------|
| Glmak2 | Full screen | HDMI      | 158   | Glmak2 score | 2280 mW   |
|        | 800x600     | HDMI      | 219   | Glmak2 score | 2235 mW   |

## VPU

### Environment conditions

- Full screen
- **Playback:**
  - Video files (video codec, audio codec)
    - You can find videos with different resolutions and format here: <https://filesamples.com/categories/video>
- **Recording:**
  - MIPI camera model: Sony imx335 MIPI-CSI
  - Video codecs
    - MOV H264

### Gstreamer video playback (decoding)

This test plays videos with different codecs and measures the performance in frames per second (fps).

**Command**

```
~# gst-play-1.0 --videosink="fpsdisplaysink video-sink=autovideosink text-overlay=true" file:///<video_file_path>
```

**Results**

| Test                                | Display resolution | Video codec | Video resolution | Score | Metric | SOM power |
|-------------------------------------|--------------------|-------------|------------------|-------|--------|-----------|
| Gstreamer video playback (decoding) | Full HD            | AVI         | 1080x720 (HD)    | 24    | fps    | 1934 mW   |

**Gstreamer video preview (encoding)**

This test records videos from a camera and encodes them to a RAM-based filesystem. Score is represented as average CPU usage during one minute of video decoding, using Sony imx335 MIPI-CSI.

**Command**

```
~# gst-launch-1.0 v4l2src device=/dev/video3 num-buffers=150 ! 'video/x-raw, format=YUY2, width=1280, height=720, framerate=(fraction)30/1' ! avimux ! filesink location=output.avi
```

| Test                               | Video codec | Video resolution | Score | Metric | SOM power |
|------------------------------------|-------------|------------------|-------|--------|-----------|
| Gstreamer video preview (encoding) | Raw         | (HD)             | 30    | fps    | 1729 mW   |

**Audio****Environment conditions**

- Playback audio files
  - WAV 44100 Hz, 16 bit, stereo
  - MP3 128 Kbps, 16 bit, stereo
- Recording audio files
  - WAV 44100 Hz, 16 bit, stereo
  - WAV 22050 Hz, 16 bit, stereo

**Audio playback**

This test plays audio files in different formats. The only score is the power consumption. You can find sample audio files here: <https://filesamples.com/categories/audio>.

**Command**


---

```
/* Wav files */
~# aplay <file>
/* MP3 files */
~# gst-launch-1.0 filesrc location=<file> ! id3demux ! queue ! beepdec !
alsasink
```

---

**Results**

| Test                      | Audio file                   | SOM power |
|---------------------------|------------------------------|-----------|
| Audio playback (decoding) | WAV 44100 Hz, 16 bit, stereo | 1539 mW   |
|                           | MP3 128 Kbps, 16 bit, stereo | 1539 mW   |

**Audio recording**

This test records audio files in different formats. The only score is the power consumption.

**Command**


---

```
~# arecord -f cd sound.wav --duration 60
~# arecord -f S16_LE -c 2 -r22050 sound.wav --duration 60
```

---

**Results**

| Test                      | Audio file                   | SOM power |
|---------------------------|------------------------------|-----------|
| Audio playback (decoding) | WAV 44100 Hz, 16 bit, stereo | 1544 mW   |

## **For more information**

---

See the [ConnectCore documentation portal](#) for additional information, including hardware reference manuals, comprehensive software documentation, links to design documents, and hardware compatibility reports.