



ConnectCore MP15 Performance and Power

Benchmarking Report

Application Note

Revision history—90002598

Revision	Date	Description
A	May 2025	Initial release.
B	April 2026	Correct instrumentation model specification.

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Introduction

This document characterizes power consumption and performance for the ConnectCore MP15 SOM. It includes detailed measurements representing a variety of use cases and includes performance tests for key interfaces, including CPU, memory, Wi-Fi, and video and audio playback.

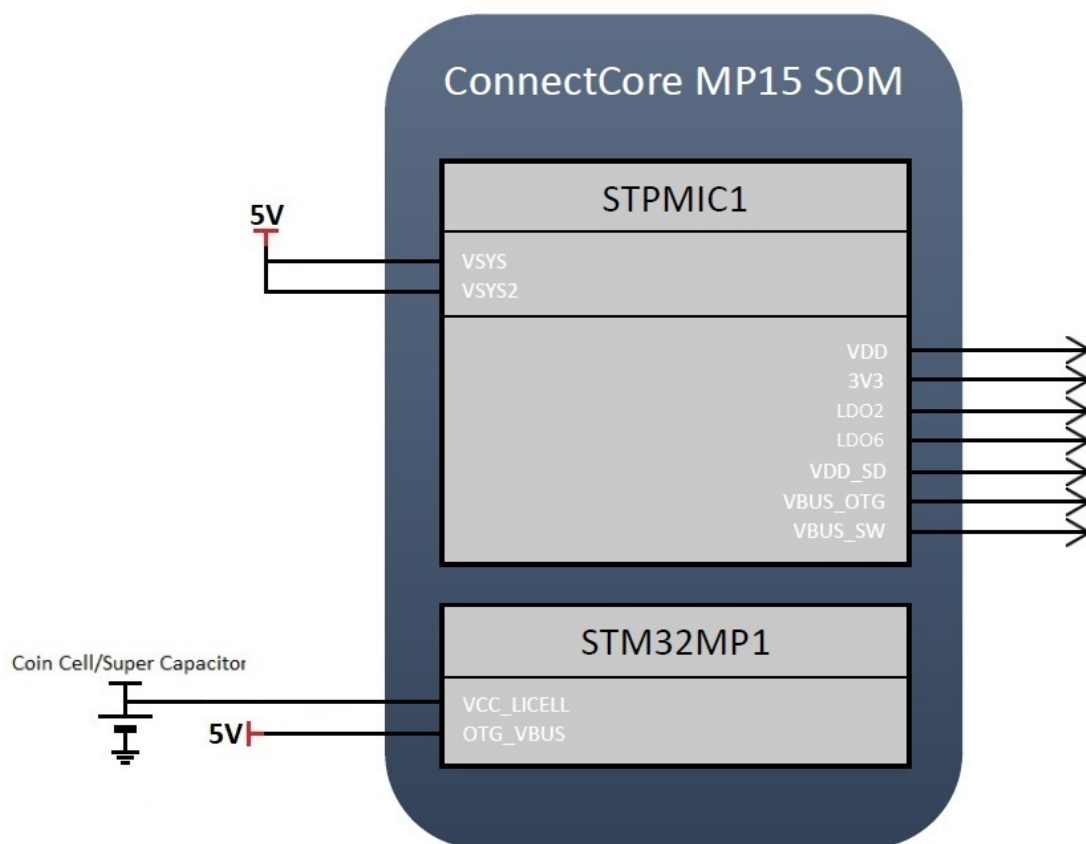
Note This information is provided as a reference on the capabilities of the ConnectCore MP15 platform. You may see different figures due to software or other factors.

Power architecture

The following diagram represents the full power architecture distribution of the ConnectCore MP15 module with integrated PMIC and CPU:

- The STPMIC1A PMIC
- The STM32MP157 SOC

The following diagram shows a typical application:



Input power supplies

The ConnectCore MP15 requires two primary power supply inputs:

- VSYS
- VSYS2

VSYS and VSYS2 are the input power supplies to the on-module STPMIC1A 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.

Output power supplies

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

SOM power rail	Used internally in the SOM
3V3	YES
VDD	YES
VDD_SD	NO
LDO2	NO
LDO6	NO
VBUS_OTG	NO
VBUS_SW	NO

For additional information about the power architecture of the module, see the [ConnectCore MP15 Hardware Reference Manual](#).

Measurement conditions

Note The power consumption and performance figures described in this document were measured using Yocto Linux. Performance figures on systems running Android may differ.

Hardware used

The following hardware was used for the measurements:

- ConnectCore MP15 SOM:
 - Variant 0x01: Dual 650MHz, M4, GPU, 512MB DDR3L, 512MB NAND flash, -40/+85C, Wireless, Bluetooth
 - PN: 55002119-01
- ConnectCore MP15 DVK:
 - PN: 55002167-01

Software used

Digi Embedded Yocto

The software used for performance tests is the pre-built installer binary image for Digi Embedded Yocto 4.0-r4 release, available on the [Digi support site](#) (md5sum: bd5bdde5a7d4c0ee560ac15f99e72721).

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-2021.10-r5.1
Firmware	dey-4.0-r4
Kernel	5.15.118-dey+g8086dc5f8e29

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

Package	Description
	coreutils version of dd .
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.

Two additional PMIC regulators power external circuitry on the DVK: VDD and 3V3.

The power delivered to the carrier board from this regulator has to be subtracted from the total input power to estimate the power solely consumed by the SOM.

Measurement points

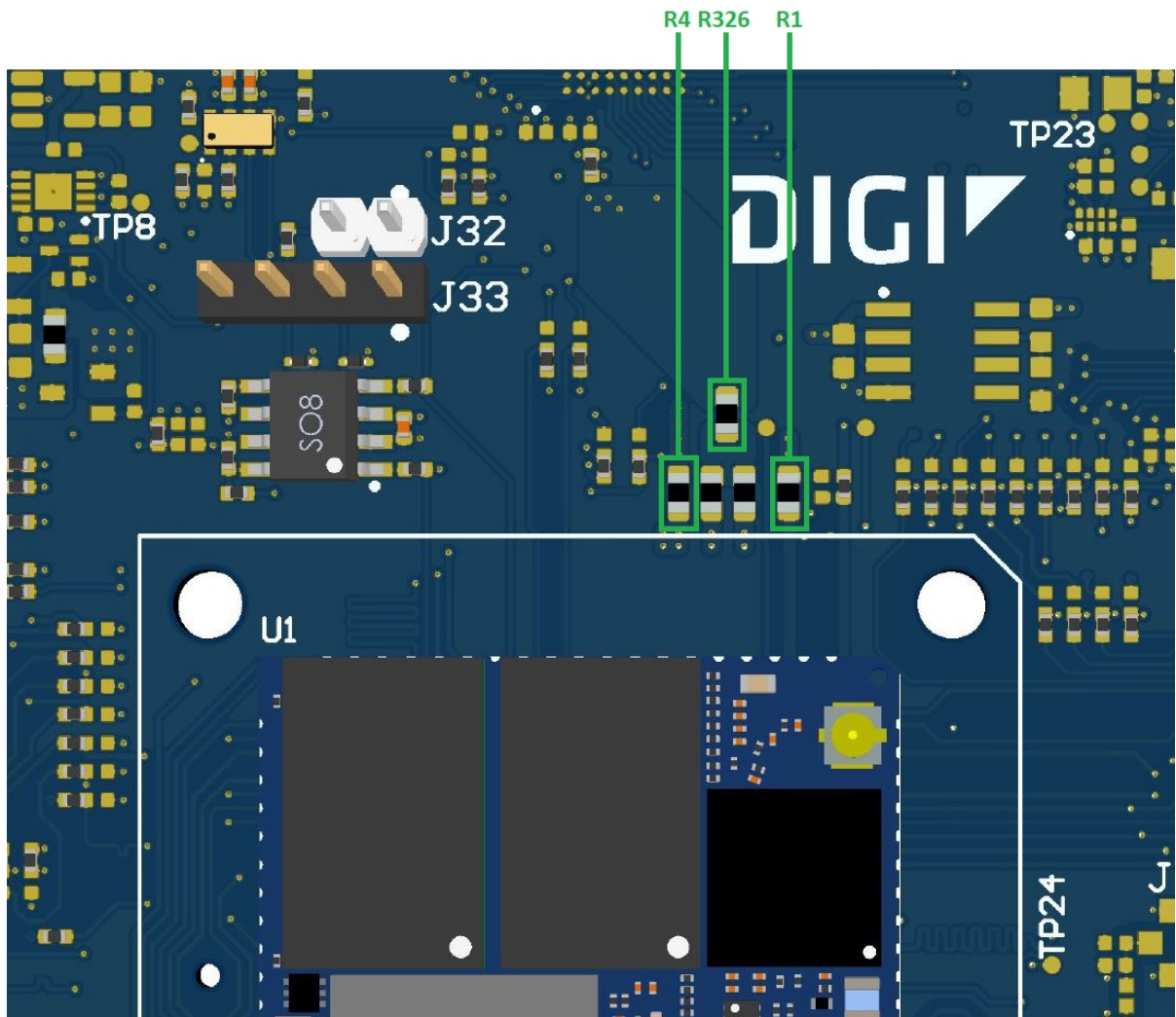
The ConnectCore MP1 DVK has several 0-ohm resistors to perform power consumption calculations.

1. Remove R326 and wire it to an ammeter to measure the current flowing **in** through VSYS and VSYS2. Measure the voltage at this point too (~5 V) to calculate the power more accurately.
2. Remove R1 and wire it to an ammeter to measure the current flowing **out** through VDD. Measure the voltage at this point too (~3.3 V) to calculate the power more accurately.
3. Remove R4 and wire it to an ammeter to measure the current flowing **out** through 3V3. Measure the voltage at this point too (~3.3 V) to calculate the power more accurately.

Power	Measuring point	Power rail	Voltage	Direction with respect to SOM
P1	R326	VSYS + VSYS2	5 V	In
P2	R1	VDD	3.3 V	Out
P3	R4	3V3	3.3 V	Out

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

Resistor location on the ConnectCore MP15 DVK



Use cases

Digi measured power consumption of the ConnectCore MP15 SOM in the following use cases:

- Low-power modes
 - Power-off
 - Suspend to RAM
 - System idle
 - RTC
- Active modes (such as I/O, 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 two seconds, or run:

```
~# poweroff
```

Mode	SOM power
KS0	325 uW

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
KS1	106.023 mW
KS1*	26.8 mW

* To obtain this result, you must disable all the wake up sources except for the on/off button:

```
echo disabled > /sys/devices/platform/soc/5c004000.rtc/power/wakeup
echo disabled >
/sys/devices/platform/soc/5c004000.rtc/rtc/rtc0/alarmtimer.0.auto/power/wakeup
echo disabled > /sys/devices/platform/soc/5c009000.i2c/power/wakeup
echo disabled > /sys/devices/platform/soc/5c009000.i2c/i2c-6/6-
0052/power/wakeup
echo disabled > /sys/devices/platform/soc/40013000.i2c/power/wakeup
```

System idle

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

Mode	SOM power
KS2	913 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
KS3	13.5 mW

Note To obtain this value, add a jumper in J9 between pins 1 & 2. Linux initializes the external RTC, and both RTCs (CPU and in the DVK) are consuming from the coin-cell. You must disable the external RTC in the DTB.

Active modes

The [Performance tests](#) section, containing the performance benchmarks for different tests, presents the power measurements for active modes beside each benchmark score.

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	3296	iter./s	1184 mW

Memory

perf-bench

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

Command: memset

```
~# perf bench -f simple mem memset -s 200MB
```

Command: memcpy

```
~# perf bench -f simple mem memcpy -s 200MB
```

Results

Test	DDR3L in SOM	Operation	Score	Metric	SOM power
perf-bench	Intelligent Memory SMIC DDR3L SDRAM 4Gb x 16 - 40°C-85°C	memset	1394	MB/s	1118 mW
		memcpy	522	MB/s	1263 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	Operation	Score	Metric	SOM power
IOzone3	NAND *	NETSOL SMIC NAND Flash 4Gb 3.3V BGA63	Read	432.95	MB/s	1140 mW
			Write	54.5	MB/s	
IOzone3	microSD card	Kingston microSD HC1	Read	21.37	MB/s	1252 mW
			Write	10.08	MB/s	
IOzone3	USB 2.0	USB-3.0 to sata: Samsung v-nan SSD 860 PRO 6Gb/s (USB 3.0 to SATA)	Read	27.72	MB/s	1307 mW
			Write	29.46	MB/s	

* Only 150 MB available to perform the test.

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 send/receive	Metric	SOM power
iPerf3	ETH0 (Marvell 88E1512-A0)	Gigabit	942/941	Mbits/sec	1480.35 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 (Marvell 88E1512-A0)	Gigabit	GET (target to host)	100.70	MiB/s	1485 mW
			PUT (host to target)	49.12	MiB/s	1331 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

The target is acting like an access point. This setup requires an auxiliary device connected to the network created by the target. A mobile phone with the 5 GHz band can be used with the [iperf3](#) application.

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)	44.4/43.6	Mbits/sec	1354 mW
		5 GHz (802.11ac)	72.4/71.6	Mbits/sec	1212 mW
	Soft-AP	2.4 GHz (802.11b/g/n)	40.3/40.3	Mbits/sec	1323 mW
		5 GHz (802.11ac)	64.4/64.4	Mbits/sec	1353 mW

GPU

Environment conditions

- Full screen

Glmark2

Glmark2 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
Glmark2	1280x800	HDMI	34	Glmark2 score	1697 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: [Pcam 5C Diligent](#)
 - 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

```
~# gplay-1.0 <video-file>
```

Results

Test	Display resolution	Video codec	Video resolution	Score	Metric	SOM power
Gstreamer video playback (decoding)	1280x800	MOV H264	960x540 (SD)	-	-	1491 mW
			640x360 (SD)	-	-	1328 mW
		AVI	1280x720 (HD)	-	-	1421 mW
			960x540 (SD)	-	-	1351 mW

Gstreamer video recording (encoding)

This test records videos from a camera and encodes them to a RAM-based file system. Score is represented as the average of the fps recorded in one minute.

Command

```
~# gst-launch-1.0 v4l2src device=/dev/video1 ! video/x-raw,width=1920,height=1080 ! waylandsink
```

The command line considers the MIPI camera was detected as **/dev/video1**.

Parameters **width** and **height** are adjusted for each resolution.

Results

Test	Video codec	Video resolution	Score	Metric	SOM power
Gstreamer video recording (encoding)	MOV H264	640x480 (SD)	11	fps	1365 mW
		320x240	13	fps	1300 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	1032 mW
	MP3 128Kbps, 16 bit, stereo	1025 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	1012 mW
	WAV 22050 Hz, 16 bit, stereo	1020 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.