

Overo Series Performance and Power Technical Reference

[Power Management](#)

[Overo Operating Temperatures](#)

[Performance Benchmarks: Overo Series](#)

[Reliability and US MIL-STD-810F Testing](#)

[Test Results](#)

[In Use Experience:](#)

[Test Results:](#)

[Processor Documentation](#)

[OMAP3503 Processor on Overo Earth COM & Overo Air COM](#)

[OMAP3530 Processor on Overo Water COM, Overo Fire COM & Overo FE COM](#)

[TPS65950 Integrated Power Management IC on Each Overo COM](#)

[Cortex A8 Architecture](#)

[Hardware Floating Point](#)

[Component Information and Manufacturer Specification Downloads](#)

Power Management

The OMAP3 hardware architecture contains a wealth of power management features. Unfortunately, mainline Linux support for these features has been quite limited until recently.

Gumstix suggests that customers review this [overview of OMAP3 power management with 2.6.39-pm](#) - by Steve Sakoman, which takes a brief look at the state of power management as of June 2011

Gumstix has implemented the TPS65950 integrated power management IC from Texas Instruments on each Overo COM. The [TPS65950](#) integrated power management IC has 3 DC/DC's, 11 LDO's, audio codec, USB HS transceiver & charger.

The power management features are still in an experimental branch of Linux-OMAP, so Gumstix hasn't completed any testing. The current plan is to wait until these power management features are merged into the mainline Linux-OMAP to alleviate any concerns for their stability.

A Gumstix Overo COM draws 250 mA @ 4v (with Wifi & Bluetooth switched off)

For the TPS65950 interrupt lines on the Overo COM,

1. Gumstix Overo COM FAB revisions \geq 2516, INT1 is connected to GPIO_0_4030 IRD on the OMAP.
2. Gumstix Overo COM FAB revisions \leq 2410, INT1 is connected to GPIO112_4030 IRQ on the OMAP.

Overo Operating Temperatures

- Each product of the Overo series available for purchase at www.gumstix.com has been built with components rated for commercial temperature operation, unless noted on a particular product page.
- e.g. The Overo FE COM has been built with components rated from -40C < 85C except for the microSD card slot and the Bluetooth/Wifi module. See the [Overo FE COM product page](#) for more details.
- In an order that includes 120 x Overo COMs or more, a customer could have any of the Overo COMs built with components rated to the same extended temperatures.

Performance Benchmarks: Overo Series

The OMAP3 hardware architecture contains a wealth of power management features. Unfortunately, mainline Linux support for these features has been quite limited until recently.

Gumstix suggests that customers review this [overview of OMAP3 power management with 2.6.39-pm](#) - by Steve Sakoman, which takes a brief look at the state of power management as of June 2011

The OMAP35xx Application Processors use the ARM Cortex-A8, a super scalar 32-bit CPU core. The Cortex-A8 is notable for the NEON instruction set extensions intended for multimedia processing which use a register file and execution pipeline separate from those used for the base ARM instruction set.

In the OMAP35xx, the NEON SIMD instructions operate on integer and single-precision floating-point vectors up to 64-bits in length and are appropriate for multimedia tasks such as audio and video codecs.

As shown in the following table, the applications processors of the OMAP family incorporate various combinations of co-processors to augment the ARM core.

Applications Processor	ARM Cortex-A8 CPU	C64x+ digital signal processor (DSP) core	POWERVR SGX for 2D and 3D graphics acceleration
TI OMAP3503	√		
TI OMAP3530	√	√	√

Reliability and US MIL-STD-810F Testing

The MIL-STD-810F test series, approved for use by all departments and agencies of the United States Department of Defense (DoD), emphasizes tailoring an environmental design and test limits to the conditions that it will experience throughout its service life.

Test Results

May 2012:

A US-based Gumstix customer passed [US Mil Spec 810.F tests](#) for both shock and vibration with an Overo IronSTORM COM, custom expansion board and flex ribbon cable connection.

These test results prove the robustness of the dual 70-pin connectors and the 27-pin connector of the Overo COM mechanical design.

The Overo COM and the expansion board were secured together using Gumstix' white [retaining spacers 48 / 48](#).

Their configuration of "ground equipment" consisted of the following components:

- an Overo IronSTORM COM connected to their custom expansion board via the dual 70-pin connectors.
- a flex ribbon cable running from a TI video encoder chip on the custom expansion board up to the 27-pin camera connector (J5) on the Overo COM.

Important Recommendations:

- Ensure that the flex cable goes into the 27-pin connector flat and level and that the flex cable remains flat and level during operation.
- Use each white ribbon cable for a maximum of ten cycles, only. One cycle = an insertion and removal to the 27-pin connector.

Test Results:

MIL-STD 810F Method 514.5 Vibration (constant acceleration) - Passed

MIL-STD 810F Method 516.5 Shock - **Passed**. Note, this testing included "40G jolts while running", according to the customer.

In Use Experience:

March 2012: Some customer experiences regarding the reliability of the Overo series have been openly discussed on the Gumstix community mailing list, such as this thread titled [overo com reliability](#).

- "We have had a little over 200 Overo COMs out in public transport vehicles (buses and ferries) since May 2009. We have had zero failures. The environment is quite harsh with units being switched on/off several times a day with no shutdown procedure and operational spikes of over 40C ambient (buses parked in direct sunlight with AirCon switched off". This Gumstix customer originally reported the testing results above.
- This mailing list discussion concluded with this posting by Mark Meisner, also a Gumstix customer: "After researching the reliability issues further we've found that the few identified issues have been already been addressed and are no longer open

issues. Therefore, we have concluded to continue to move forward with the development of our project with full confidence in the Gumstix platform".

Test Results:

July 2009:

The tests performed by this Gumstix customer simulated vibration for the equivalent of 1,642,500 kilometers, which is the average distance a bus travels in 5 years making this testing an accelerated simulation of a "Diesel Engine Road Vehicle" running over an assortment of road surfaces. Essentially, an hour of simulation equates to a number of kilometres travelled.

- Their Overo COM and Tobi expansion board configuration passed the 5 year, MIL-STD-810F 514.5 military test for Vibration (constant acceleration). This extended test result was completed successfully because the customer engineers secured the Gumstix Overo and Tobi boards together with the [retaining spacers](#) supplied by Gumstix and gluing the configuration together. This extra mechanical connection was deemed to have reduced board flexing.
- Their Overo COM and expansion board combination passed the 2-3 year, MIL-STD-810F 514.5 mark without the addition of retaining spacers, gluing or screws.

Further commentary from the customer:

- The testing done by this customer is extremely harsh.
- The customer stated that "the design and robustness of the Gumstix Overo series without the retaining spacers is extremely high and under normal circumstances are fit for purpose" and "that they "don't believe that any units would have actually failed in the field".
- The customer tested 3 Gumstix Overo units: one announcement unit, one tracking unit and an Overo Earth/Summit combination. All three configurations complied with this MIL-STD-810F standard until approximately the 2 – 3 year mark. Under strobe light/vibration observations without spacers, the customer could see the U8 end of the Overo flexing at resonant frequencies.

The customer reported that this flexing does not happen to the Overo COM when the retaining spacers are fitted. The customer believes that this 'flexing' is causing small amounts of wear to the plug/sockets that eventually leads to failure at the 2-3 year mark when cycled under this accelerated simulation.

Processor Documentation

OMAP3503 Processor on Overo Earth COM & Overo Air COM

- [Overview](#)
- [Technical reference manual](#)
- [Data sheet, errata, other technical documents](#)

OMAP3530 Processor on Overo Water COM, Overo Fire COM & Overo FE COM

- [Overview](#)
- [Technical reference manual](#)

TPS65950 Integrated Power Management IC on Each Overo COM

This component acts as peripheral and power management chip for the OMAP3 processor. It include 3 DC/DC convertors, 11 LDOs, the audio (hardware) codec, the USB high-speed transceiver, and a charger.

- [Overview](#)
- [Technical reference manual](#)

Cortex A8 Architecture

The Cortex A8 Reference Manual may be found [here](#).

Hardware Floating Point

Hardware floating point is discussed in [chapter 13](#) and [chapter 16.6.5](#) of the Cortex A8 Reference Manual. Linux does not use floating point and thus it has no effect on OS performance. If developers use OE, then all the correct compiler flags are set automatically for Gumstix' processor architecture.

Component Information and Manufacturer Specification Downloads

Gumstix publishes component information and posts links to manufacturer information online in the "details" tab on the product page of each Overo COM and expansion board.

