

Overo Series Design and Production Technical Reference

[Overo STORM-P to STORM-Y Transition Guide](#)

[Wireless Certifications:](#)

[External changes:](#)

[Electrical changes:](#)

[Software changes:](#)

[Design Recommendations of Custom Expansion Board for Overo Series](#)

[Schematics & CAD Layout Files](#)

[CAD Files for Computers-on-Module](#)

[Version Control and Lot Tracking](#)

[Version Control and Lot Tracking](#)

[The Fab Number](#)

[Assembly and Lot Codes](#)

[Product Features and Functions](#)

[Keep-outs and Height Restrictions for a Custom Expansion Board](#)

[40-pin and 60-pin Headers](#)

[Retaining Spacers](#)

[Approvals: FCC and CE](#)

Overo STORM-P to STORM-Y Transition Guide

This guide explains use of Texas Instruments WL1831 modules for WiFi and Bluetooth, instead of Wi2Wi's W2CBW0015 module. The aim of this guide is to highlight the key differences and make the transition between these modules as easy as possible.

The Overo AirSTORM-Y, FireSTORM-Y, and Iron STORM-Y modules differ from the corresponding Overo Air, Fire, and Iron STORM-P COMs only based on the module providing wireless connectivity. All Overo STORM-Y and Overo STORM-P COMs provide WiFi (802.11b/g/n), including access point mode, as well as Bluetooth (v3.0 or better) via a single antenna. The Overo STORM-Y COMs use the WL1831 module from the Texas Instruments WiLink 8 series, while the Overo STORM-P COMs use Wi2Wi's W2CBW0015 module containing a Marvell SD8787 chipset. While functionally speaking these Overo product-lines are very similar, some external electrical, and software changes that may be relevant to customers migrating from Overo STORM-P to Overo STORM-Y are summarized below:

Wireless Certifications:

- Wi2Wi W2CBW0015 module:
<https://pubs.gumstix.com/documents/Approvals/Wi2Wi/W2CBW0015/>
- Texas Instruments WL1831 (WL18xx) module:
http://processors.wiki.ti.com/index.php/WL18xxMOD_Certificates

External changes:

- The footprint, dimension, and temperature specifications of the COM are unchanged
- Visually, the wireless module on the Overo STORM-Y series is enclosed in a metallic, silver-colored package; on the Overo STORM-P COMs, the module is in a black, plastic package
- The position of the antenna connector has moved by 1mm
- The Overo STORM-Y series COMs do not have a blue LED (D1) indicating WiFi activity

Electrical changes:

- No electrical changes are needed when interfacing with the COM
- The wireless module on the '-P' COMs interfaces both Wifi and Bluetooth functionality via an SDIO to the processor
- The wireless module on the '-Y' COMs uses SDIO for Wifi and a UART for Bluetooth
- Physical and electrical details are summarized in the Overo System Reference Manual at https://gumstix.com/images/overo_signals_latest.pdf.

Software changes:

- If you are using Yocto 1.7 (Dizzy) or Ubuntu images from Gumstix, no changes are required - the images support both series of COMs
- The u-boot Bootloader (i.e. the MLO and u-boot.img files) doesn't require any changes
- Support for the WiLink 8 chip is added on Gumstix's Linux 3.17 branch (<https://github.com/gumstix/linux/tree/yocto-v3.17.y>). This is the recommended baseline kernel for Overo STORM-Y COMs
 - The Wilink8 module needs the CONFIG_BT_WILINK, and CONFIG_WL_TI options
 - The Wi2Wi module needs the CONFIG_BT_MRVL_SDIO and CONFIG_MWIFIEX_SDIO options
- The Wilink8 module needs different firmware (see <https://github.com/gumstix/meta-gumstix/commit/43f62462d709297a9ac3823b9fe2fe64d155bf10>)
- In userspace, the Wilink8 Wifi interface appears as 'wlan0' where, by default, the Wi2Wi Wifi interface appears as 'mwan0'. Gumstix Yocto images present both interfaces as 'wlan0' working around this non-standard choice.
- As the Wilink8 bluetooth interface is available via the ttyO1 serial port, userspace must 'hciattach' to this port. Gumstix Yocto images do this automatically.

Design Recommendations of Custom Expansion Board for Overo Series

To help improve the design of a custom expansion board for the Overo series, this list offers hints and tips with some potential design pitfalls to be avoided:

1. Use the SYSEN line to protect any IO pins to the OMAP CPU. SYSEN is brought high when the Overo is ready to communicate; driving GPIOs before this point can damage the processor.
2. Like SYSEN, USB_CPEN can be used as an enable line for USB_VBUS; this is done on several Gumstix expansion boards such as Tobi. However, it is not necessary to gate the USB_VBUS line; as long as VBUS on the USB connector gets 5V, the USB interface should work correctly.
3. For high-speed signal lines, consider adding small-valued series resistors to limit signal reflections. Users have reported success adding 33 ohm series resistors to the CLK and CMD lines of the MMC3 external interface.

4. Noise on the UART_RX3 line during boot can interrupt the normal booting sequence. Consider adding a pull-up resistor to a SYSEN-gated 1.8V supply on this line.
5. VBACKUP provides battery backup to the real-time clock. It should be left open or connected to a rechargeable lithium coin cell which is trickle charged when the Overo is powered on. Do not tie this pin to ground as suggested in the PMIC documentation without disabling the trickle charge feature in software.
6. ADC inputs should not be driven above 2.5V.
7. Expansion board PCB should be less than 1.2mm thick to accept [Overo retaining spacers 48 / 48](#). Hole diameter should be 1.65mm.
8. Expansion board PCB should be less than 1.55mm thick to accept [Overo retaining spacers 48 / 62](#). Hole diameter should be 1.65mm.
9. Ensure a good connection of the Overo COM onto the expansion board via the pair of 70-pin connectors. An example of making a good connection can be found in the Gumstix videos posted on Youtube. eg [Connecting an LCD and Overo COM to a Palo43 board](#).
10. The design should allow flat, horizontal connection of the flex cable into the 27-pin connector (J5) both for the process of flex cable insertion and during operation.
11. Both the flex cable and the 27-pin connector (J5) should be cycled a maximum of ten (10) times. Insertion and removal of a flex cable would be considered one (1) cycle.

Other key links for [designing with Gumstix](#).

Last modified May 15 2002: adding recommendations regarding flex cable and 27-pin connector.

Modified April 17th 2012: added reference to Overo retaining spacers 48 / 62

Schematics & CAD Layout Files

Schematics and Board Layout Files for Expansion Boards

- Gumstix' expansion board schematics and layouts are published under a creative commons licence.
- Go to pubs.gumstix.com/boards to find the schematic for your expansion board

- Every board is marked with a revision number that corresponds to the correct schematic; be sure these match
- The definitive resource for functionality on an expansion board is its product page at store.gumstix.com. Where the schematic for a board offers functionality not listed on the product page, the product page should be taken as correct. Certain features may be designed into a schematic, which may or may not be populated during the fabrication process.
- Schematics and board layouts may be viewed using [Eagle software from CadSoft](#).

CAD Files for Computers-on-Module

CAD models for computers-on-module and expansion boards are published in a variety of formats at pubs.gumstix.com/boards. Files for COMs are in the COMS folder. Gumstix does neither provide nor license the schematic for any Gumstix COM.

Version Control and Lot Tracking

To determine the version of the bare PCB, bill of materials, and manufacturer work order used to build a specific Gumstix COM or expansion board, review the information posted in the "[Version Control and Lot Tracking](#)" section.

Version Control and Lot Tracking

There are three aspects to define a hardware revision: the Fab, the Assembly, and the Lot. Every Gumstix COM and expansion board carries a white label with identification numbers to allow tracing of the build version and manufacturing history of that product.

The Fab Number

The "Fab" is the word Gumstix uses to name a particular "bare PCB" and the "Fab number" corresponds to one product type. For example, all Summit expansion boards have the Fab Number PCB30001 printed on the board in ink when the Fab was created. They also have a Revision number immediately following the PCB30001, such as -R2450.

Fab numbers of Gumstix COM boards start with "PF"

- e.g. PF3503-R2606 defines bare PCB version 2606 of an Overo COM (PF3503)
- Fab number of Gumstix Expansion boards start with "PCB"

- e.g. PCB30005-R2467 defines bare PCB version 2467 of a Chestnut expansion board (PCB30005)

Note that one or more products may be built on the same fab, depending upon which assembly (bill-of-materials) is used in manufacturing; e.g. two products with the same PCB layout and different component populations.

Assembly and Lot Codes

An Assembly describes a particular populated PCB and the Assembly number corresponds to one bill of material populating each of the different reference locations on the bare PCB. As of July 2010, Gumstix has requested that its manufacturers label every assembled board with a small white sticker carrying the following information:

- the Assembly number
 - COMs begin with "GS" e.g. GS270B-XM4-R2635 defines assembly version 2635 of a verdex pro COM (GS270B)
 - Expansion boards begin with "BRD" e.g. BRD30001-R2563 defines assembly version 2563 of a Summit expansion board (BRD30001)
- the Lot number defining the particular work-order (build) of the specific assembly e.g. W/O #69217
- the Date code to define the date of assembly of that specific board --- e.g. "BT-10-26" to define the manufacturer code ["BT"] and year ["10"] and week of the year ["26"].

Note that some vendors have chosen alternative forms of the date code to correspond to their own manufacturing process, or to append their internal work-order number as well.

Product Features and Functions

To know what function is shipping on any particular Gumstix product, review the "Features" information as presented on the product page at www.gumstix.com rather than depending upon the function designed into the schematic posted in pubs.gumstix.com. Gumstix makes this recommendation because function designed on to a Gumstix board (as per schematic) may or may not be populated during the build process.

Keep-outs and Height Restrictions for a Custom Expansion Board

Layout information has been posted for the Overo COMs in the [COMs section of \[pubs.gumstix.com\]\(http://pubs.gumstix.com\)](#).

This information defines the board outline, connector positions, and keep-out areas. Components placed under the COM outside the keep-out areas should be limited to 1.2mm height.

40-pin and 60-pin Headers

For signal and pin number information of the headers available on the Overo expansion boards, go to the sections linked below.

The 40-pin and 60-pin header, posted online in the two sections linked below, should be considered accurate if there is a difference when compared to the information of a schematic posted at pubs.gumstix.com or any labelling on an expansion board.

- [40-pin header](#)
- [60-pin header](#)

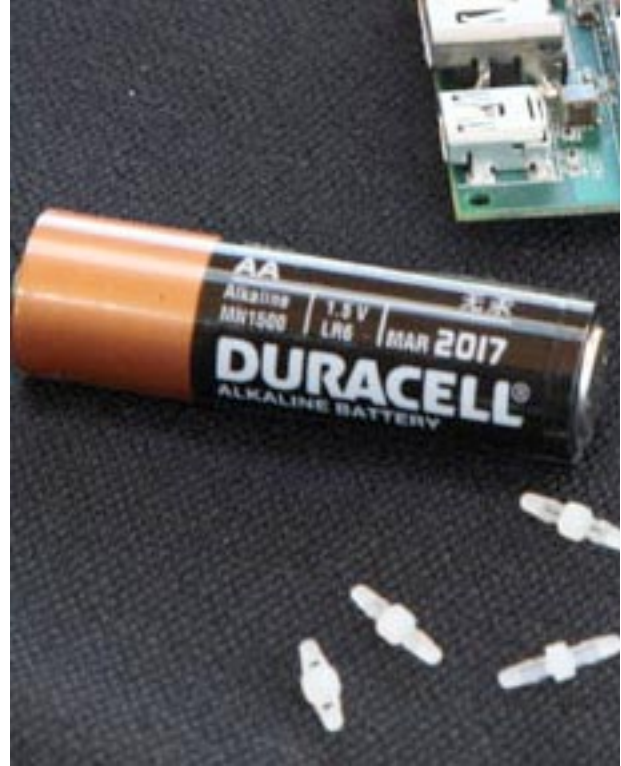
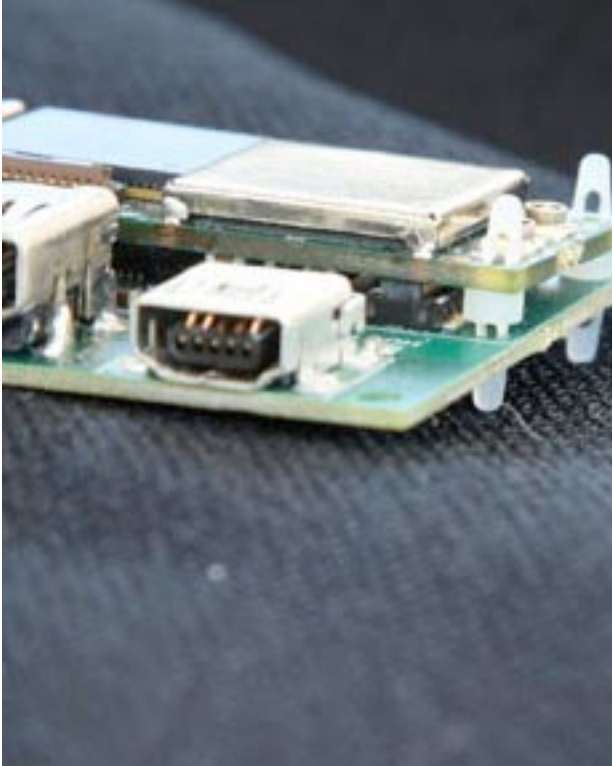
Retaining Spacers

The retaining spacers provide additional inter-board bonding between an Overo COM and an expansion board. These spacers can be used in applications of high mobility and vibration. Results from a Gumstix customer testing to the US MILspec for constant acceleration have been posted [here](#).

Four spacers can be mounted on each Overo COM: one in each corner.

Gumstix supplies four retaining spacer with each Overo COM purchased at www.gumstix.com. Retaining spacers must be listed separately in a volume order.

The spacers can be purchased in a 50-pack in the ACCESSORIES section of www.gumstix.com, [linked here](#).



Approvals: FCC and CE

Wi2Wi Module: The documents regarding the FCC certification and CE certification for the Wi2Wi module are posted in pubs.gumstix.com [here](#). The Wi2Wi module provides Bluetooth® and 802.11b/g wireless communications on several Overo COMs,

Gumstix customers have used these Wi2Wi documents to pass certification of their own Gumstix-based product(s). They have not needed to have the Gumstix COM certified to either standard.