ngff-cardem: M.2 WWAN modem carrier with SIMtrace and cardem support

The ngff-cardem modem carrier board is a useful utility for evaluating any kind of cellular modem in the more and more popular M.2 form-factor.

M.2 form-factor modems are pretty commonly found for all cellular technologies, but particular with LTE-A and 5G modems. Contrary to their predecessor mPCIe, M.2 supports higher transmission speeds of USB 3.0 super-speed.

Key Features

The main features of the board can be described as follows:

• on-board SAM3S controller suitable for operating SIMtrace2 tracing or cardem (remote SIM) firmware.
• on-board switching power regulator generating the 3.3V supply voltage for the M.2 modem
• SIM and Modem Power switchable by firmware
• USB 2.0 high-speed and USB 3.0 super-speed signals exposed on USB 3.0 micro-B connector (microB-A cable included)
• One 2FF (mini-SIM) slot for RUIM/CSIM/SIM/USIM.
• M.2 PCM/12S pins are exposed on a 2.54mm break-out header.
• PERST, GPS_DISABLE and W_DISABLE can be configured via jumper
• Power LED, Modem Status LED and VBUS LED

Compatibility

As the M.2 modem carrier adheres to the M.2 mechanical form factor and standardized pin-out, it should work with any 3042 or 3052 sized WWAN modem, irrespective of the supplier.

Open Source Hardware

The ngff-cardem was created as an OSHW (Open Source Hardware) design.

This means not only schematics are available, but also the full design files including PCB layout. Anyone may create derivative works under the terms of the Creative Commons Attribution Share-Alike (CC-BY-SA) license.

For more information, see https://projects.osmocom.org/projects/ngff-cardem/wiki/Wiki

Ordering

The ngff-cardem is available for direct purchase from the sysmocom webshop:

http://shop.sysmocom.de/products/ngff-cardem

For volume orders, please inquire at sales@sysmocom.de.

Included Accessories

Related Products

If you are looking for a M.2 carrier without SIMtrace2/cardem functionality, check out our “ngff-breakout board”. If you are interested in stand-alone SIM tracing or forwarding, have a look at the SIMtrace2 board.

If you are interested in a carrier board that hosts more than one modem, please check out our sysmoQMOD product. It hosts four mPCIe modems with an on-board USB hub.
Mechanical / Electrical Specification

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions of PCB</td>
<td>100 x 90 mm²</td>
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<tr>
<td>Mounting</td>
<td>M3 Mounting Holes for spacers/stands</td>
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<tr>
<td>NGFF / m.2 Slot</td>
<td>3042 form factor; B key</td>
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<tr>
<td>SIM/UICC smart card slot</td>
<td>ETSI/3GPP 2FF form factor</td>
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<tr>
<td>USB port</td>
<td>USB3-micro-B (modem), USB-mini-B (SAM3S)</td>
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<td>Debug facilities</td>
<td>Serial Console of SAM3S on 3.3V UART (2.5mm 3-pin jack); JTAG</td>
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<td>LED</td>
<td>Power (green), Modem Status (yellow), VBUS present (green), SAM3S</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>5 V DC (typ) on 5.5/2.5mm barrel type, current consumption as per modem</td>
</tr>
</tbody>
</table>

Block Diagram

Further Documentation

See https://gitea.osmocom.org/electronics/osmo-small-hardware/src/branch/master/ngff-cardem/ngff-cardem.sch.pdf for a PDF rendering of the full electrical schematics of this board.