No Turn on Debug Guide

Objective

This guide is meant to be a step by step troubleshooting procedure for narrowing down the root cause of no turn on failures.

Instructions

Start on the Main Debug Flow page and follow the procedure. There are links to other sections of the document that contain helpful information or further debug steps. There are also back arrows on some pages meant to return to the original debug steps.

Equipment

This guide assumes access to the following equipment:

Multimeter with probes capable of probing 0201 components
-Oscilloscope
-Battery eliminator
-Power supply with current measuring capability
-Factory cable connected to power supply with current measuring capability
-PC with ability to flash software using fastboot and qflash tools

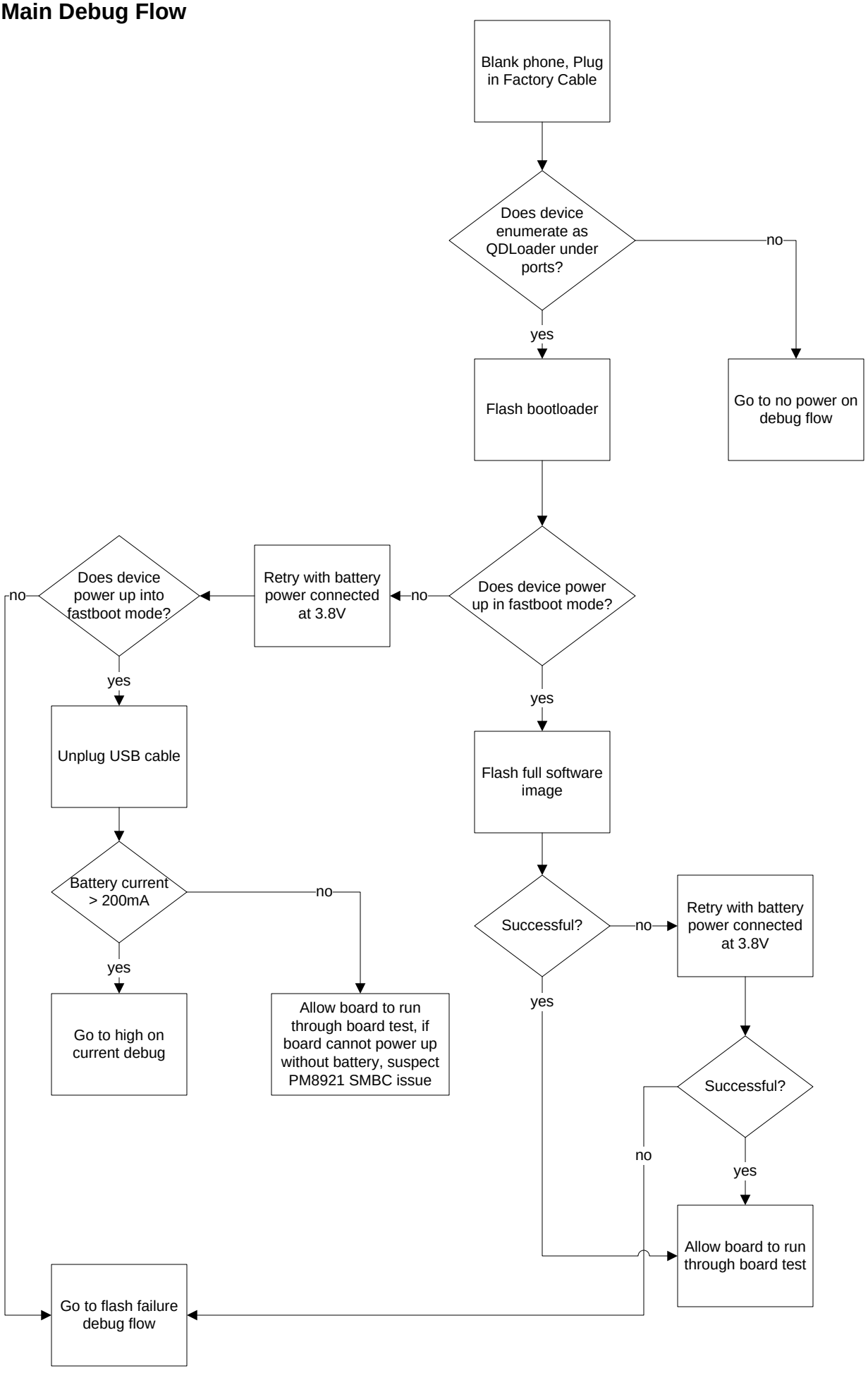
Revisions

This document will be updated and improved as new failures are analyzed. Please send feedback to Rick Jakubowski at w36108@motorola.com.

Revision History

-Document created 6/3/2013, Rick Jakubowski
-Added off/on current and stuck flash mode debug guides, 6/14/2013, Rick Jakubowski/Sanjay Patel
-Added debug steps for units that flash bootloader successfully but don't power up, 7/10/2013, Rick Jakubowski
-Fixed debug order of turn on sequence, 7/11/2013, Rick Jakubowski

Main Debug Flow



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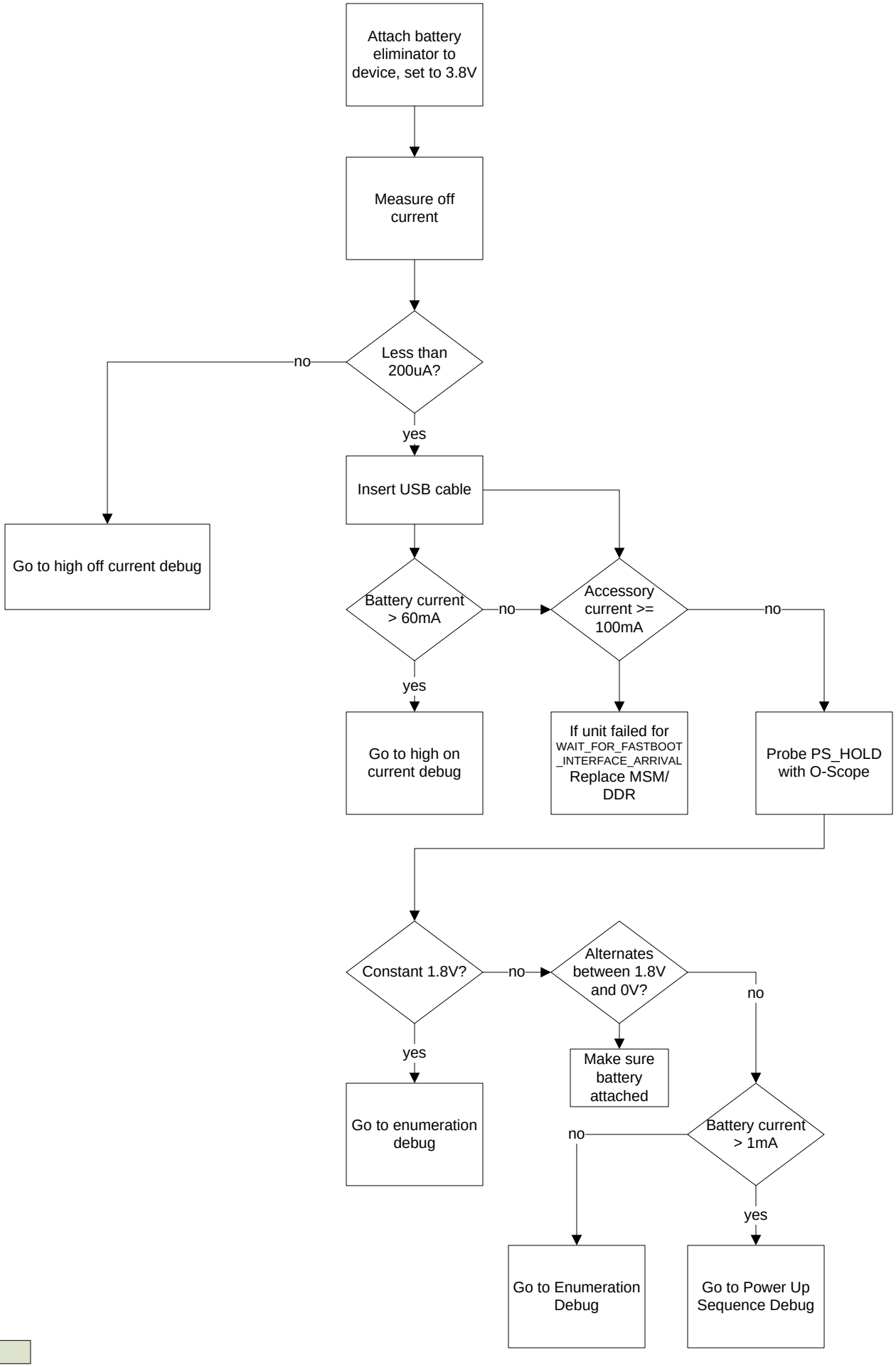
No Power On Flow



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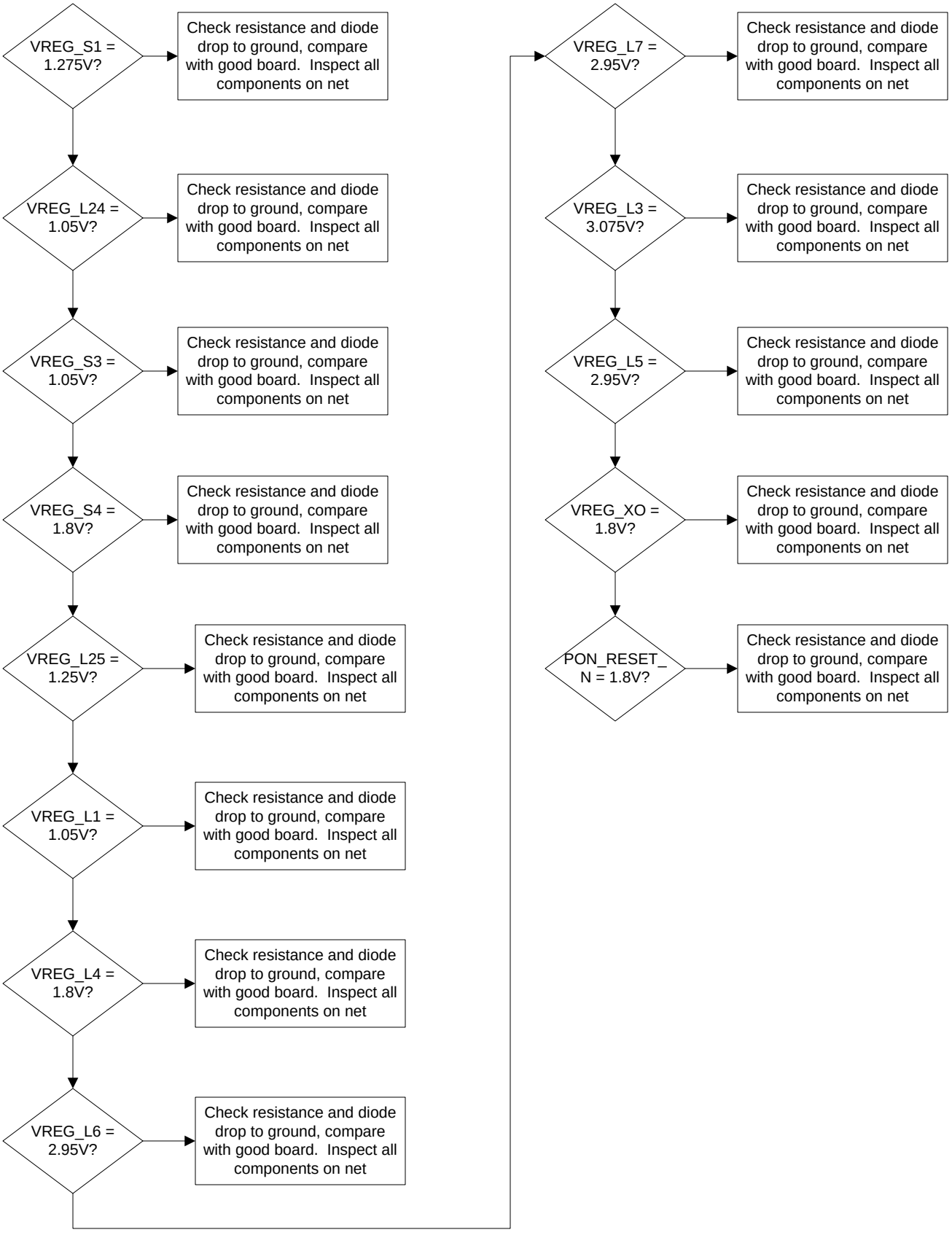
The following lists nets to probe and their expected voltage. Measure in the following order. If a voltage is more than 100mV different, there is a failure on that node. Check all parts on the node for process damage, xray IC balls, and take resistance measurement to look for a short. Also take diode drop measurement with multimeter.

Power up Sequence Flow



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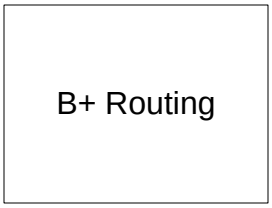
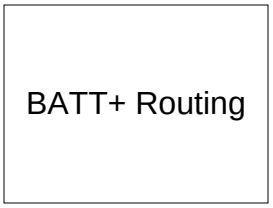
High Off Current Debug Procedure

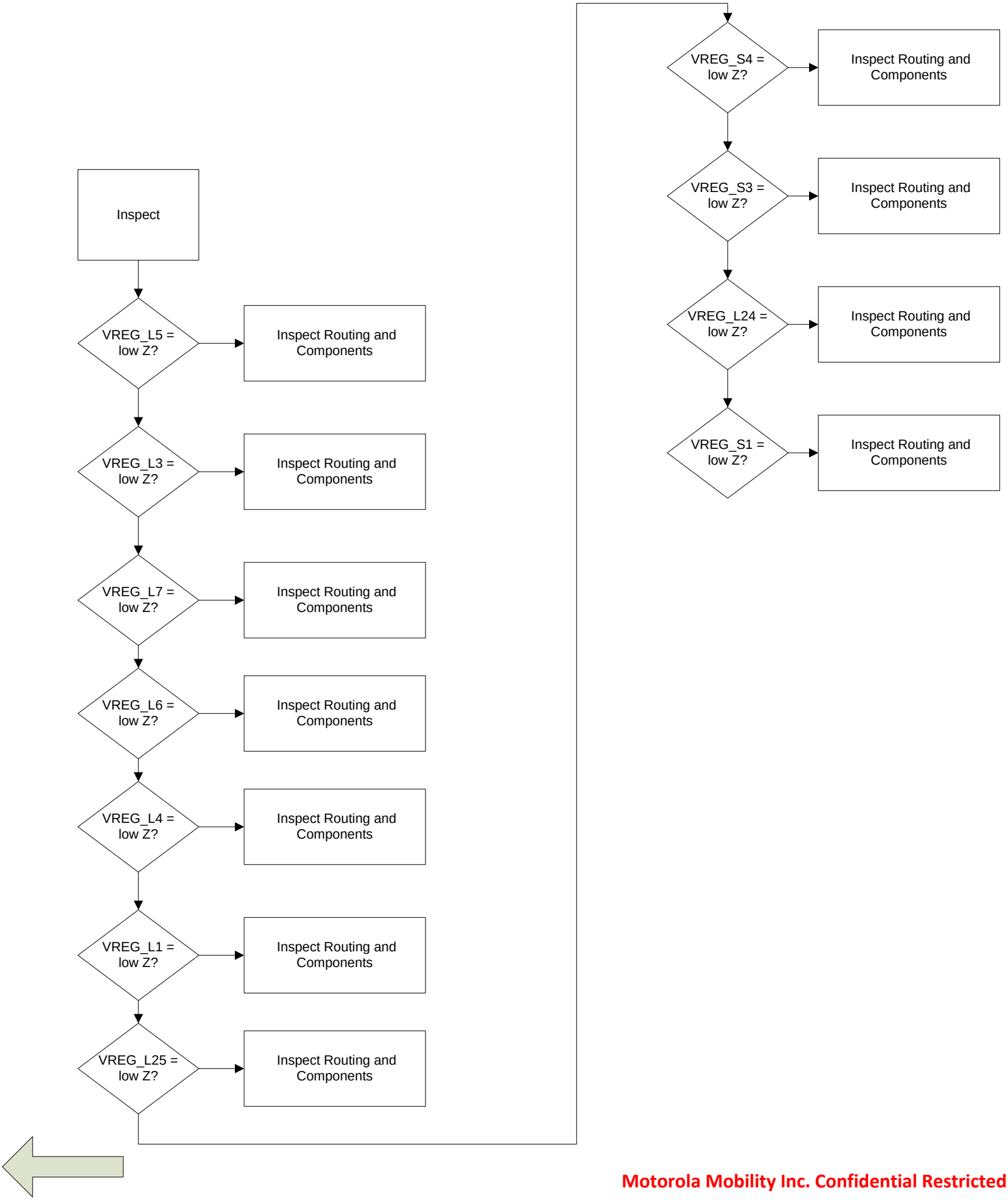
The debug technique for finding the defect causing high off current involves measuring the voltage drop between two points using a multimeter. The copper routing of the pcb trace has a resistance which will cause a voltage drop between two points along the same trace according to V = IR where I is the current going through the trace and R is the resistance of the trace between the two points being probed. If the current is in the uA range then a precision instrument will be needed that can measure voltage of less than 10uV. If the current is in the several mA range then a less precise instrument can be used. There is a graphic showing the B_PLUS and BATT_PLUS routing of the board. Pick two points to measure while a battery is attached and the high off current is being drawn from the battery. Compare to a good board to isolate the location of the extra current.





The following lists nets to probe for resistance. Measure resistance from net to ground plane and compare to normal board. Note extremely low resistance. Also measure diode drop and compare to normal board.

Power up Sequence Flow



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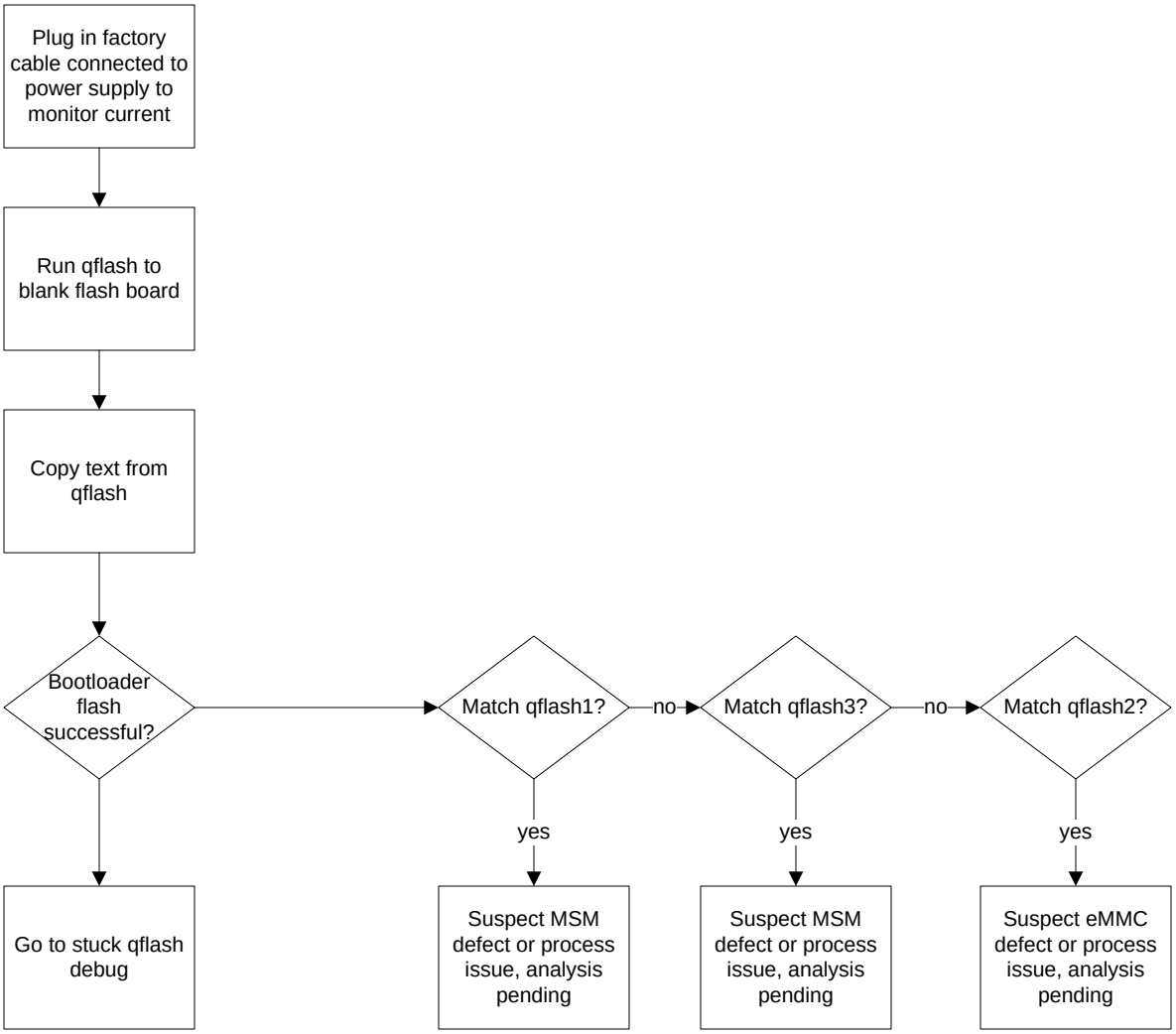
Flash Failure Flow



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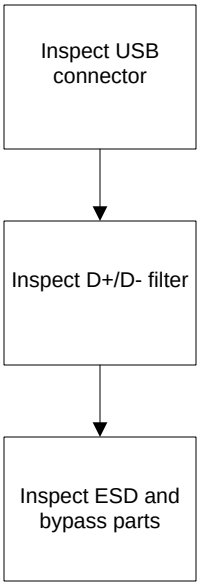
Enumeration failure flow



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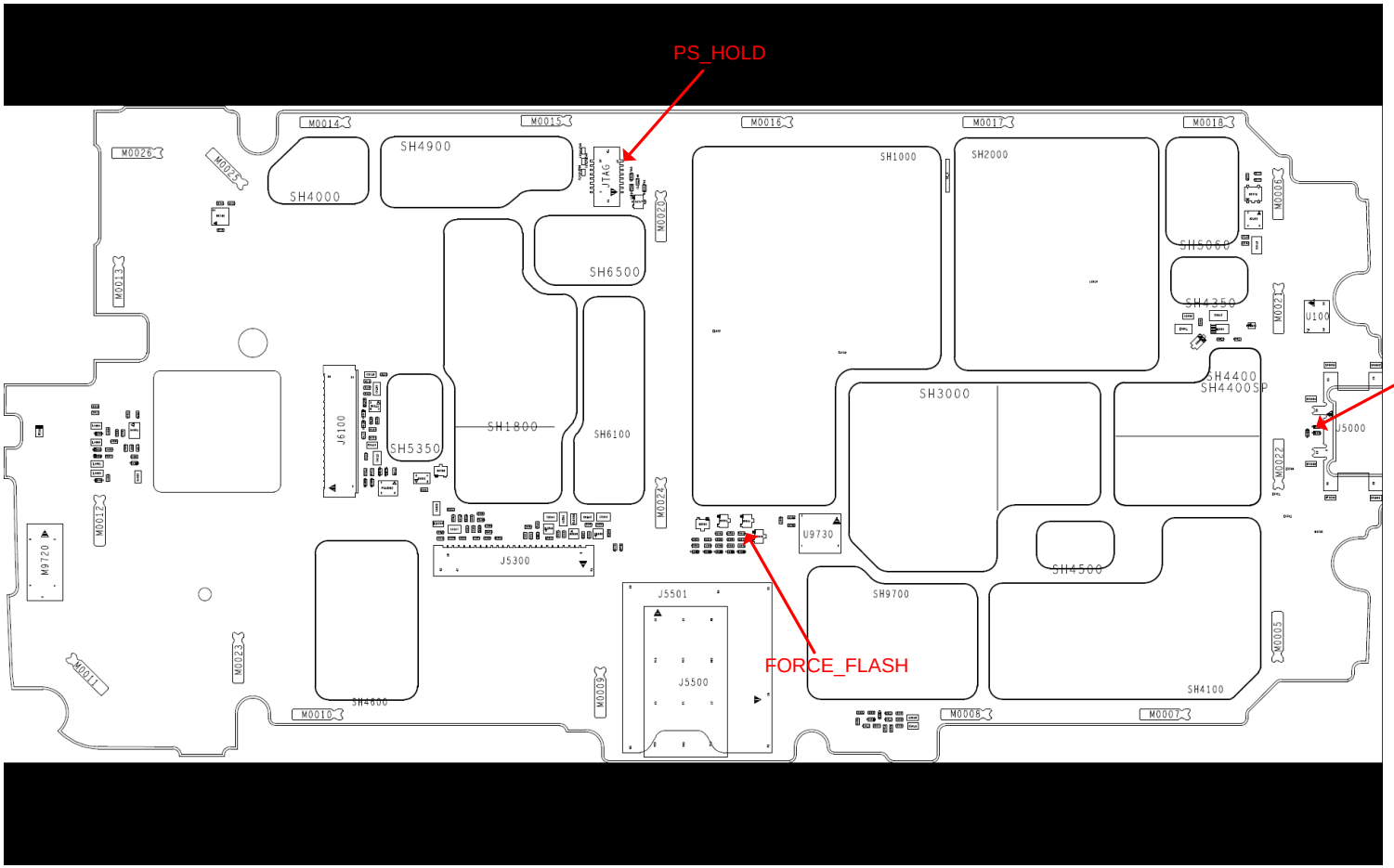
Probe point locations



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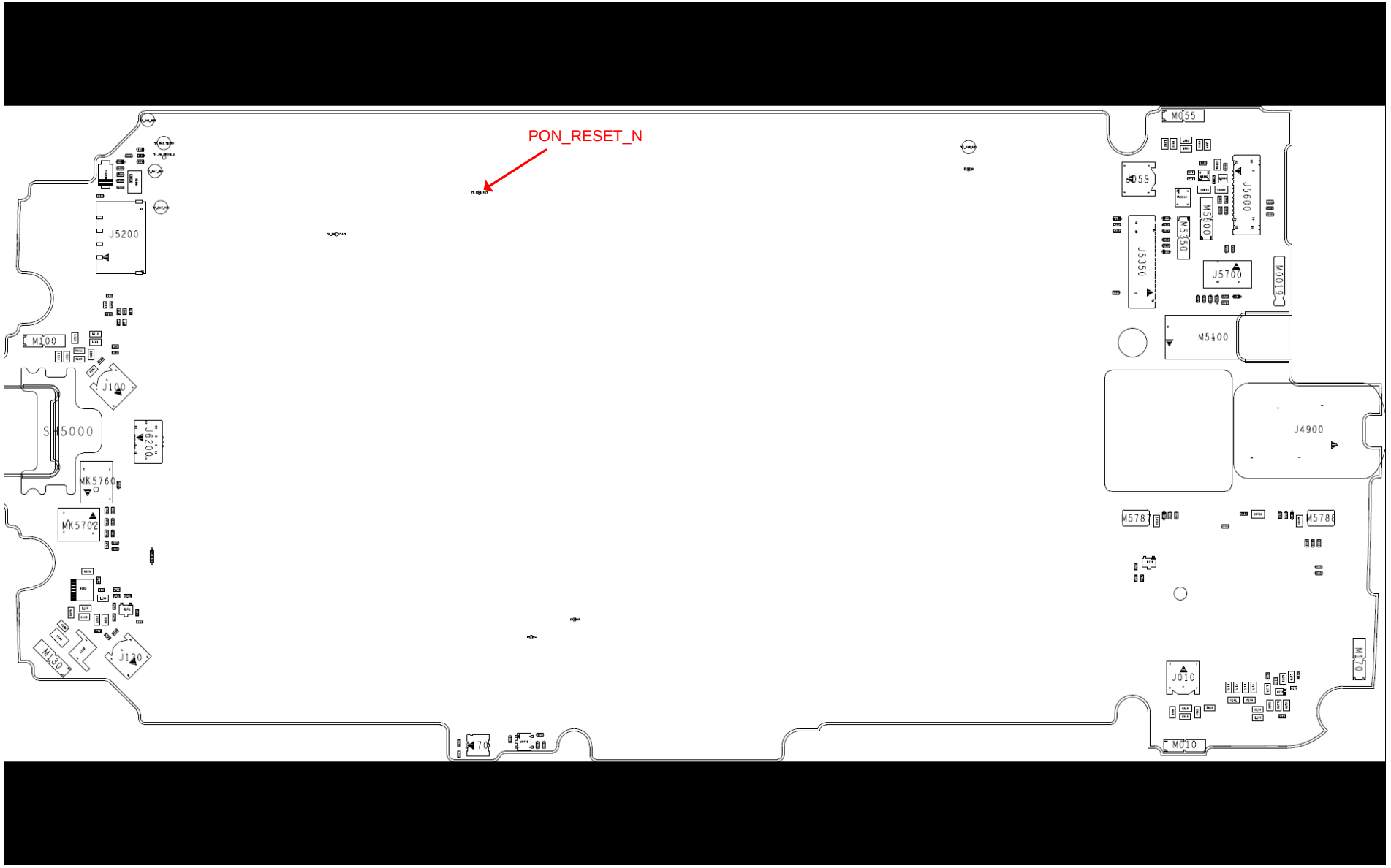
Probe point locations



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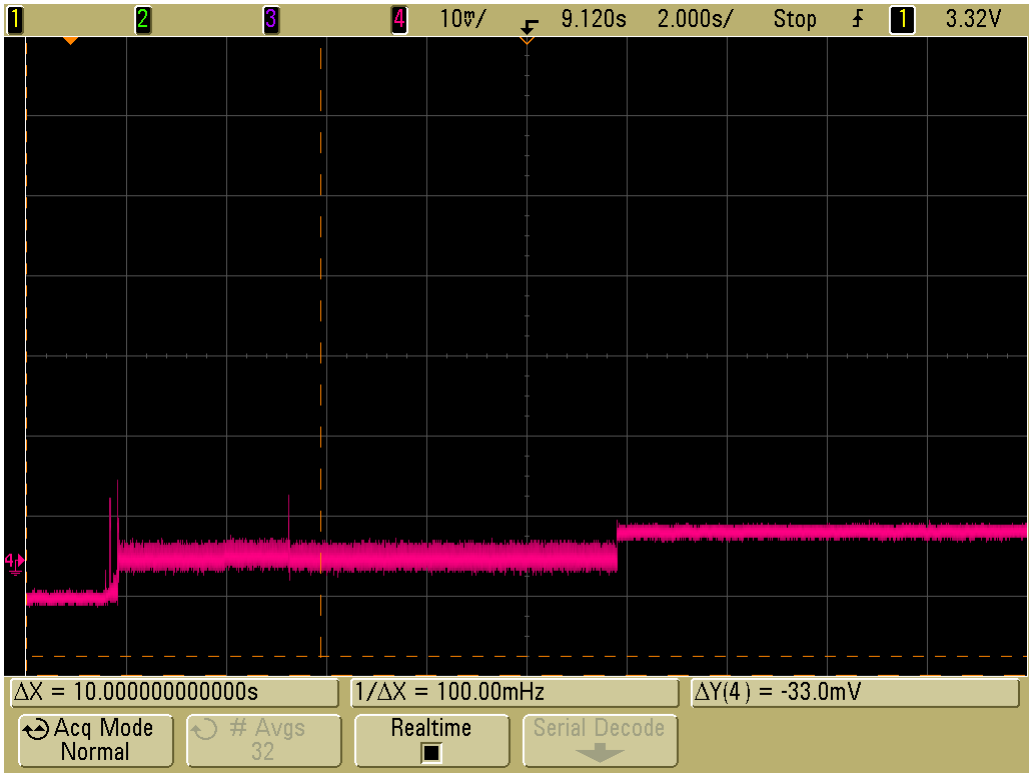
Flash failure output and current profiles

```
Motorola qflash Utility version 1.3
COMPORT      :COM12
RAMLOADER    :MPRG8960.hex
type is 0x21
7 mbn file name singleimage.bin type 33
verbose mode on
Motorola qflash dll version 1.6
RAMLOADER VERSION: PBL_DloadVER2.0
------------------------------------------------------------
DEVICE INFORMATION:
------------------------------------------------------------
Version      : 0x8
Min Version   : 0x1
Max Write Size: 0x600
Model        : 0x90
Device Size   : 0
Description   : Intel 28F400BX-TL or Intel 28F400BV-TL
------------------------------------------------------------
Using passed in packet size, changing from 0x600 -> 0x600
EXTENDED_LINEAR_ADDRESS_REC @ 0x2a000000

Write 65536 bytes @ 0x2a000000
100EXTENDED_LINEAR_ADDRESS_REC @ 0x2a010000

Write 11840 bytes @ 0x2a010000
100START_LINEAR_ADDRESS_REC @ 0x2a000000
EOF_REC
Sleeping for 3s
 Write, GetLastError:31, hdlc_finalize_packet: failed to write buffer
sdl_hello() - Failed to send frame
 Write, GetLastError:31, hdlc_finalize_packet: failed to write buffer
sdl_hello() - Failed to send frame
 Write, GetLastError:31, hdlc_finalize_packet: failed to write buffer
sdl_hello() - Failed to send frame
 Write, GetLastError:31, hdlc_finalize_packet: failed to write buffer
sdl_hello() - Failed to send frame
 Write, GetLastError:31, hdlc_finalize_packet: failed to write buffer
sdl_hello() - Failed to send frame
 Write, GetLastError:31, hdlc_finalize_packet: failed to write buffer
sdl_send_nop : failed to send frame
 Write, GetLastError:31, hdlc_finalize_packet: failed to write buffer
sdl_send_nop : failed to send frame
failed to establish handshake with device, after 6 retries, sync error code -1
```



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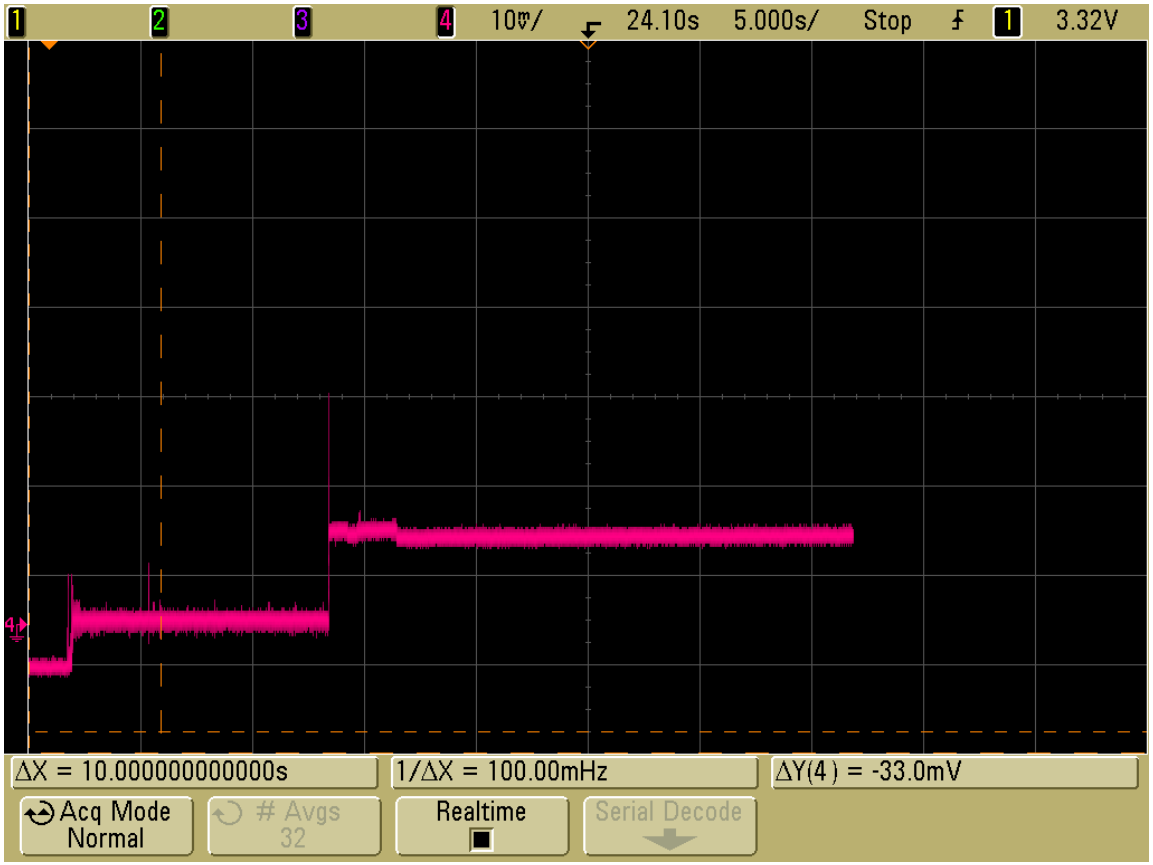
```
Motorola qflash Utility version 1.3
COMPORT      :COM12
RAMLOADER    :MPRG8960.hex
type is 0x21
7 mbn file name singleimage.bin type 33
verbose mode on
Motorola qflash dll version 1.6
RAMLOADER VERSION: PBL_DloadVER2.0
------------------------------------------------------------
DEVICE INFORMATION:
------------------------------------------------------------
Version      : 0x8
Min Version   : 0x1
Max Write Size: 0x600
Model        : 0x90
Device Size   : 0
Description   : Intel 28F400BX-TL or Intel 28F400BV-TL
------------------------------------------------------------
Using passed in packet size, changing from 0x600 -> 0x600
EXTENDED_LINEAR_ADDRESS_REC @ 0x2a000000

Write 65536 bytes @ 0x2a000000
100EXTENDED_LINEAR_ADDRESS_REC @ 0x2a010000

Write 11840 bytes @ 0x2a010000
100START_LINEAR_ADDRESS_REC @ 0x2a000000
EOF_REC
Sleeping for 3s
------------------------------------------------------------
RAM DOWNLOADER INFORMATION
------------------------------------------------------------
cmd              : 0x2
description      : QCOM fast download protocol targ
version_number    : 0x7
compatible_version: 0x2
max_block_size    : 0x400
flash_base_address: 0x0
flash_id_len      : 0x4
flash id         : eMMC
window_size       : 0x1e
number_of_sectors : 0x80
------------------------------------------------------------
sdl_send_security_mode: secutiry mode 0x0
ReadFile() failed, GetLastError: 31
No data read from USB. This may not be an error. Trying again...
ReadFile() failed, GetLastError: 2
No data read from USB. This may not be an error. Trying again...
ReadFile() failed, GetLastError: 2
No data read from USB. This may not be an error. Trying again...
ReadFile() failed, GetLastError: 2
No data read from USB. This may not be an error. Trying again...
ReadFile() failed, GetLastError: 2
No data read from USB. This may not be an error. Trying again...
ReadFile() failed, GetLastError: 2
Still no data, giving up!
sdl_send_security_mode: failed to read
failed to set security mode
```



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Motorola qflash Utility version 1.3
COMPORT :COM11
RAMLOADER :MPRG8960.hex
type is 0x21
7 mbn file name singleimage.bin type 33
verbose mode on
Motorola qflash dll version 1.6
RAMLOADER VERSION: PBL_DloadVER2.0

DEVICE INFORMATION:

Version : 0x8
Min Version : 0x1
Max Write Size: 0x600
Model : 0x90
Device Size : 0
Description : Intel 28F400BX-TL or Intel 28F400BV-TL

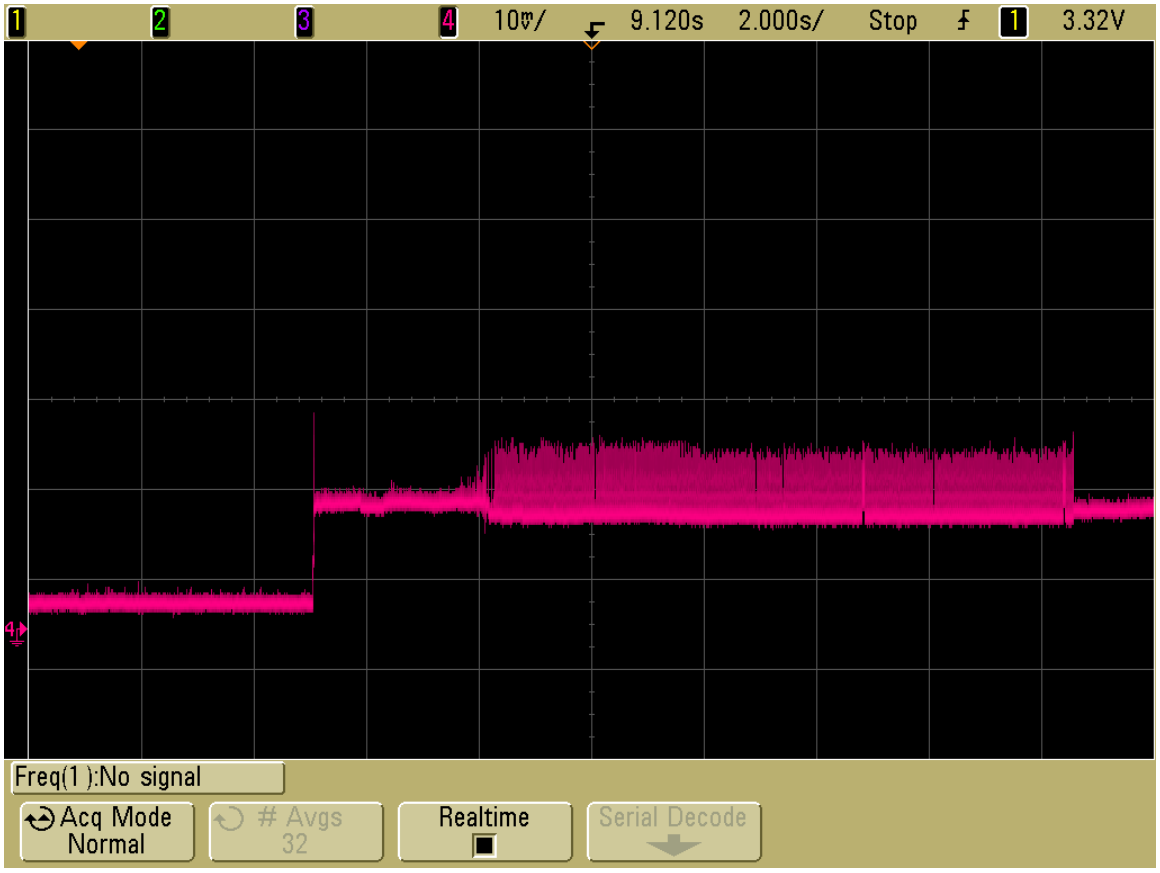
Using passed in packet size, changing from 0x600 -> 0x600
EXTENDED_LINEAR_ADDRESS_REC @ 0x2a000000

Write 65536 bytes @ 0x2a000000
100EXTENDED_LINEAR_ADDRESS_REC @ 0x2a010000

Write 11840 bytes @ 0x2a010000
100START_LINEAR_ADDRESS_REC @ 0x2a000000
EOF_REC
Sleeping for 3s

RAM DOWNLOADER INFORMATION
---
cmd : 0x2
description : QCOM fast download protocol targ
version_number : 0x7
compatible_version: 0x2
max_block_size : 0x400
flash_base_address: 0x0
flash_id_len : 0x4
flash id : eMMC
window_size : 0x1e
number_of_sectors : 0x80
---
sdl_send_security_mode: secutiry mode 0x0
Flashing singleimage.bin 1953280 bytes into device
Keeping the first packet (1024 bytes) as hostage
Will release it if all is flashed well
26No data read from USB. This may not be an error. Trying again...
No data read from USB. This may not be an error. Trying again...
No data read from USB. This may not be an error. Trying again...
No data read from USB. This may not be an error. Trying again...
No data read from USB. This may not be an error. Trying again...
No data read from USB. This may not be an error. Trying again...
Still no data, giving up!
sdl_stream_write: failed to read response, bytes read 0
flash_multi_bin_image - fatal error sdl_stream_write failed

warning: read size exceeded expected expected length, possible command failure
data received:
0x7e0e577269746520756e737563636573736675 6c2073696e6365207265745661 6c20213d2041434b0a29177e7e0d070000005772697
46520756e737563636573736675 6c2073696e6365207265745661 6c20213d2041434bfd9d7e7
e16cf857e
sdl_close_multi_image: response packet is wrong
Error happened during flashing binary, error code -92



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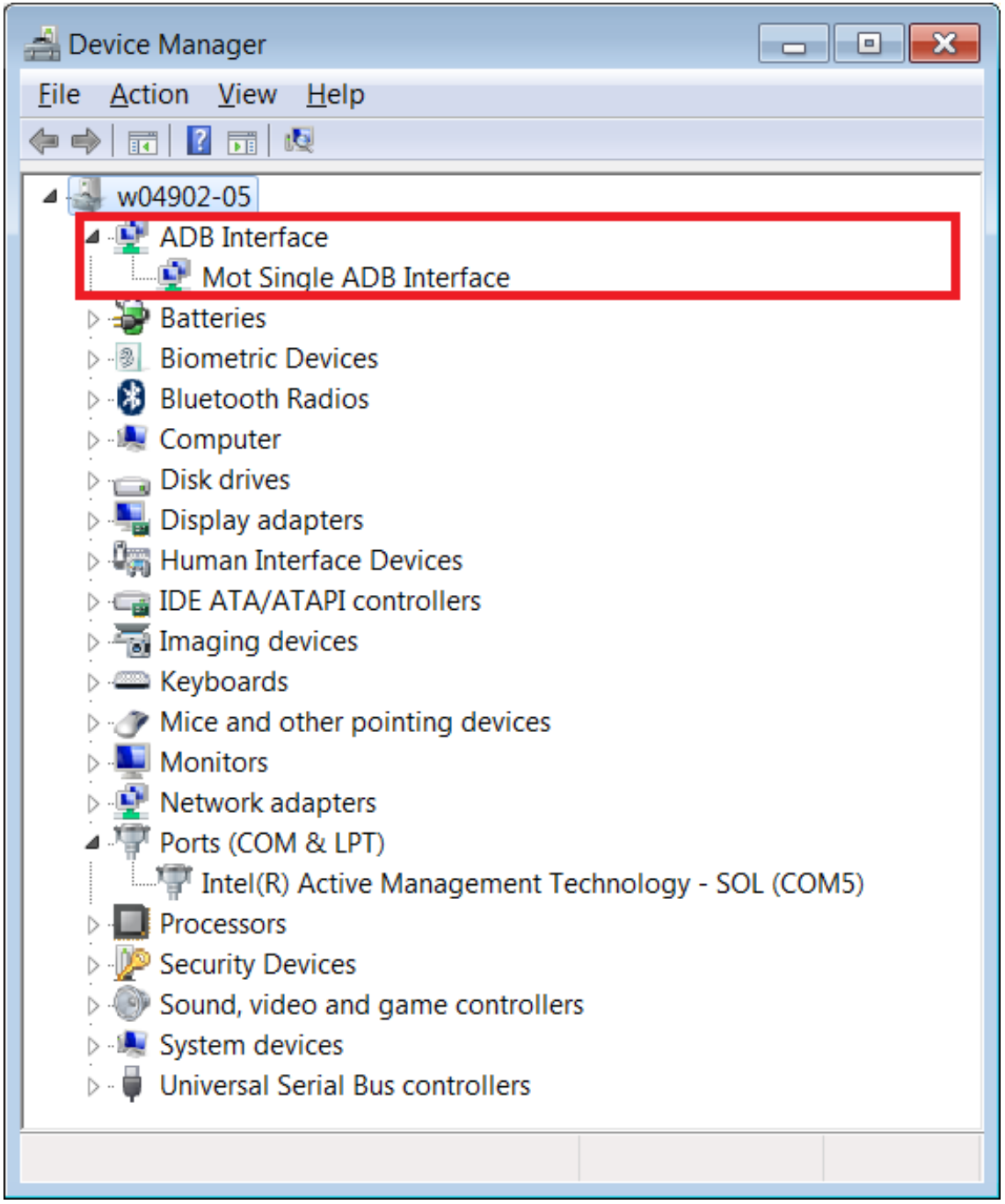

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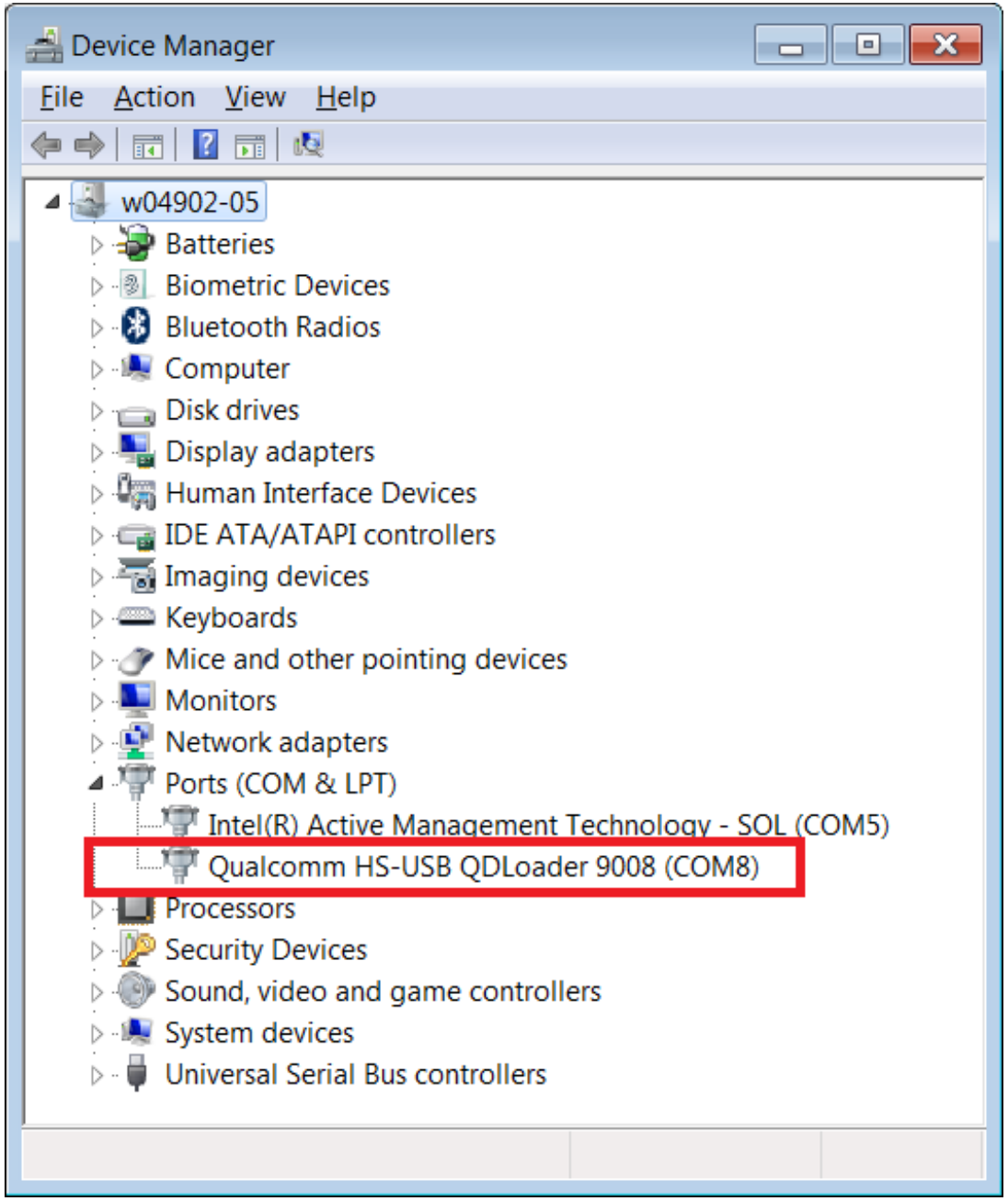

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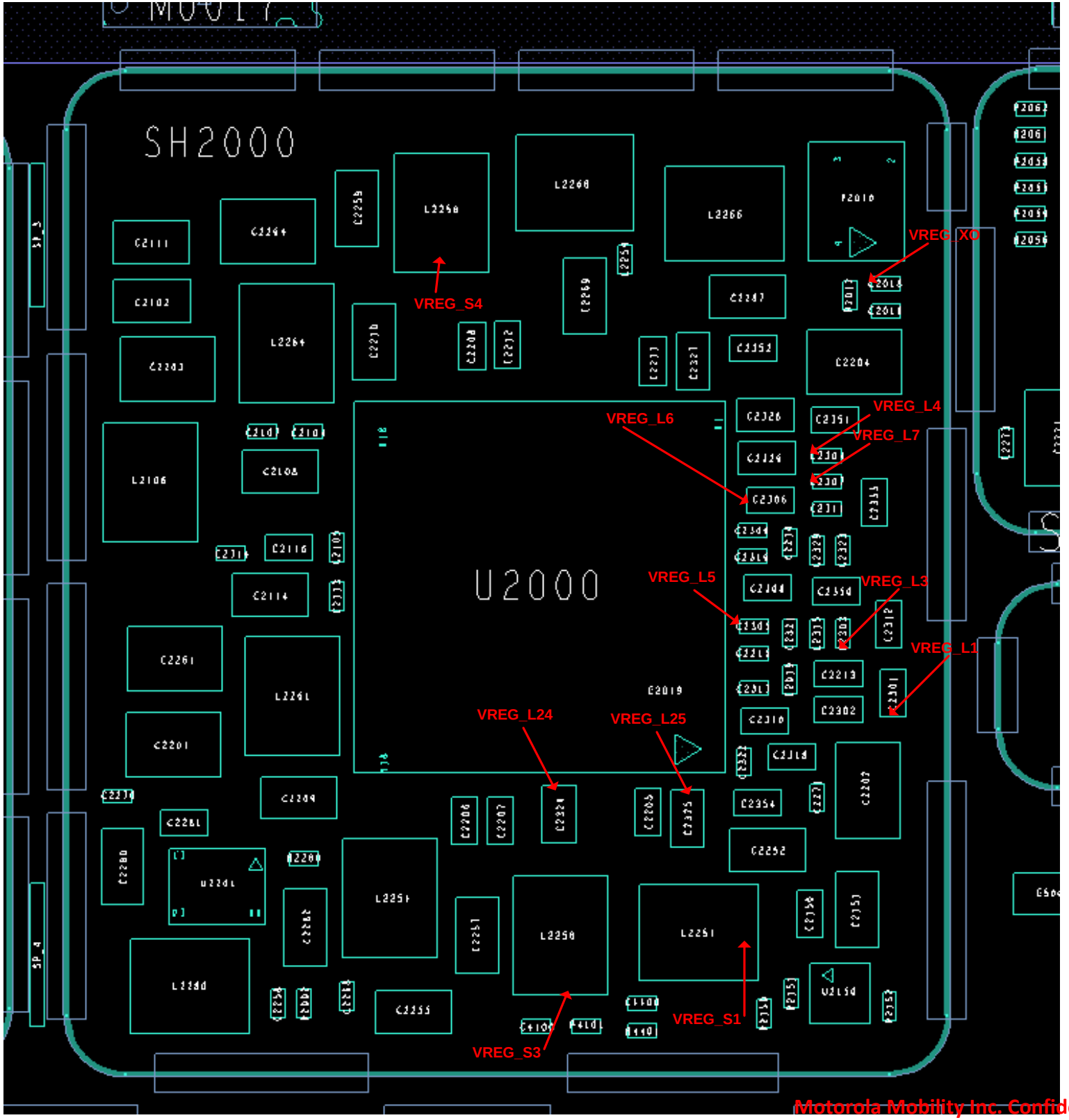

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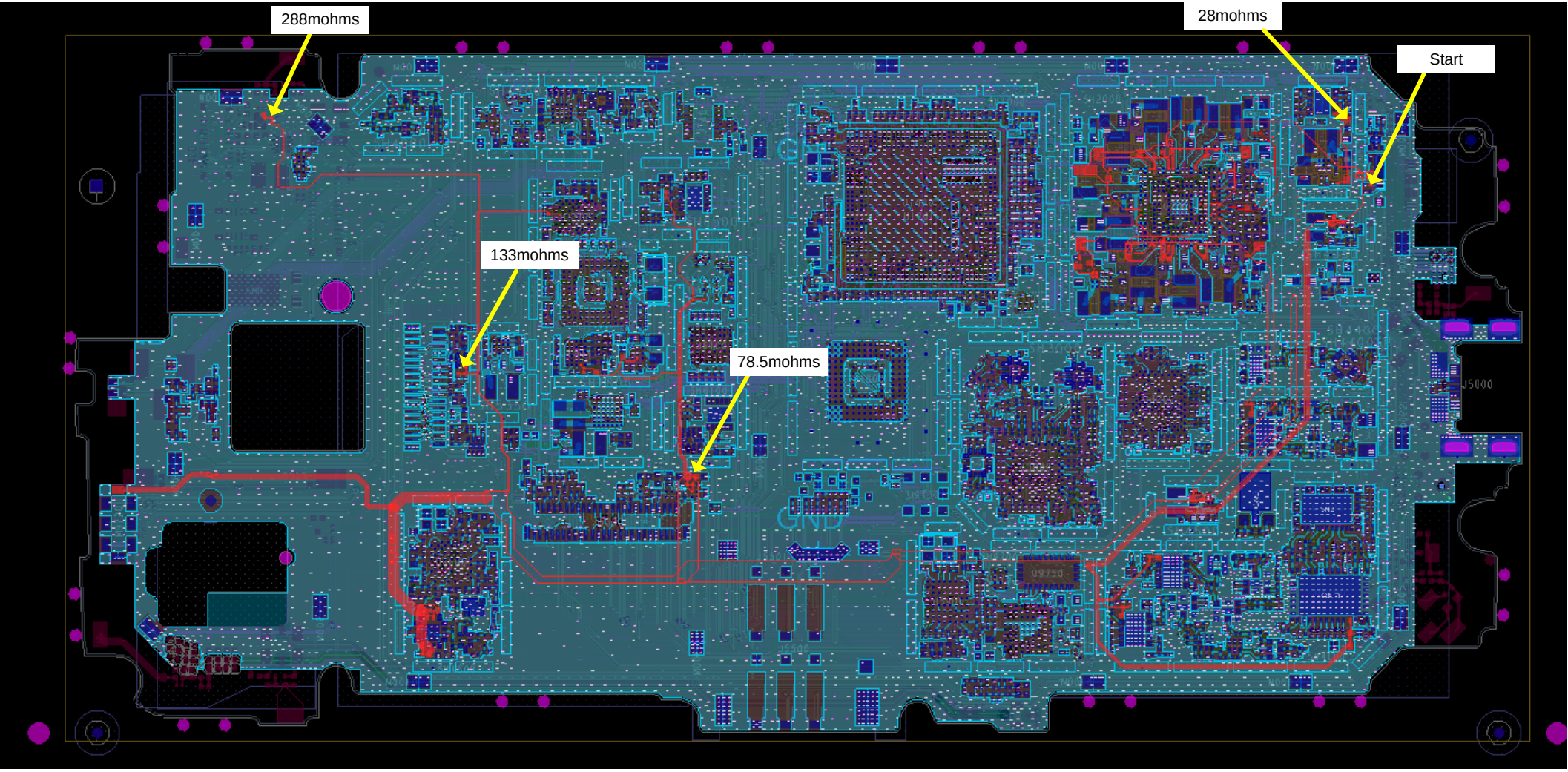
B_PLUS Routing



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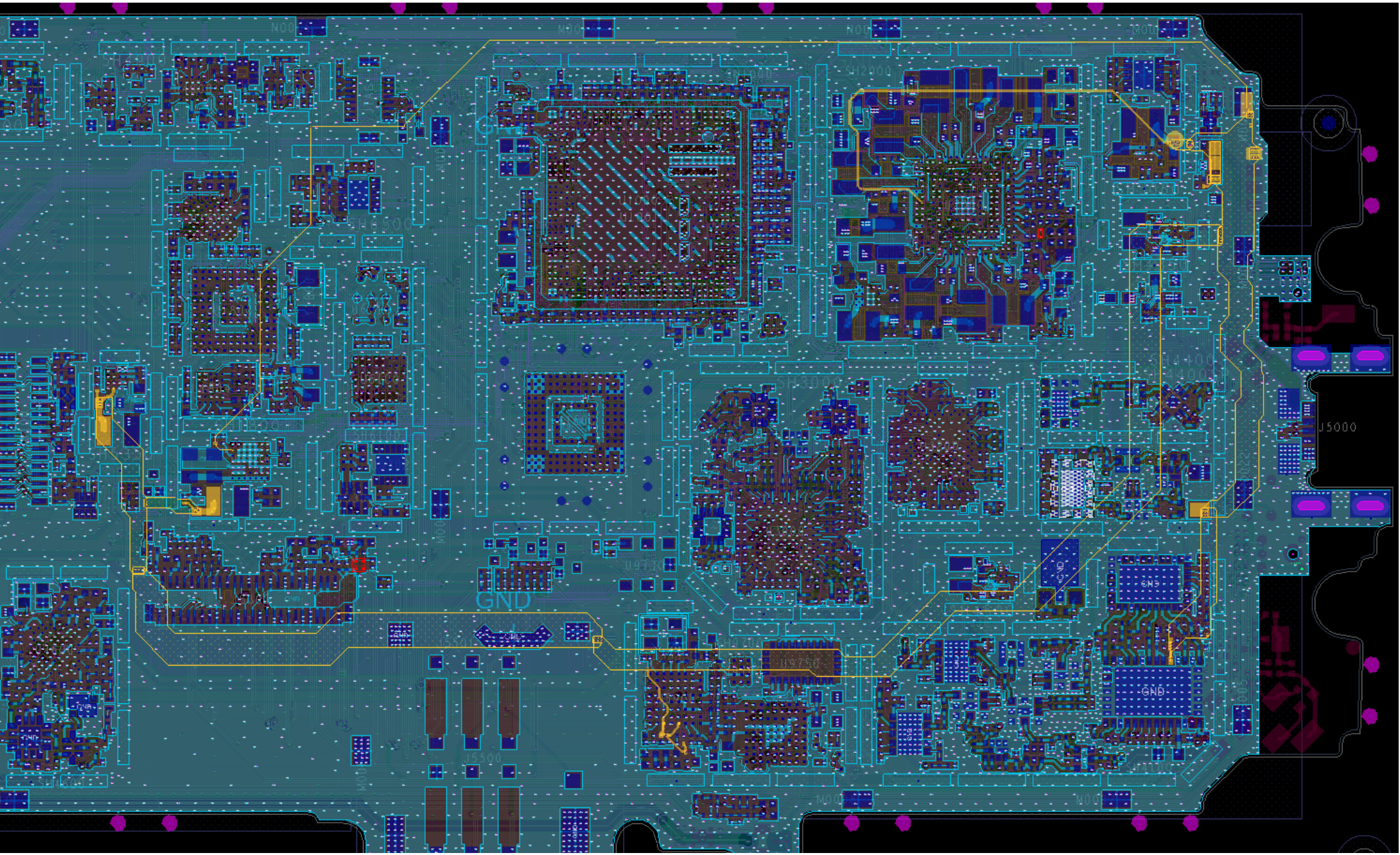
BATT_PLUS Routing



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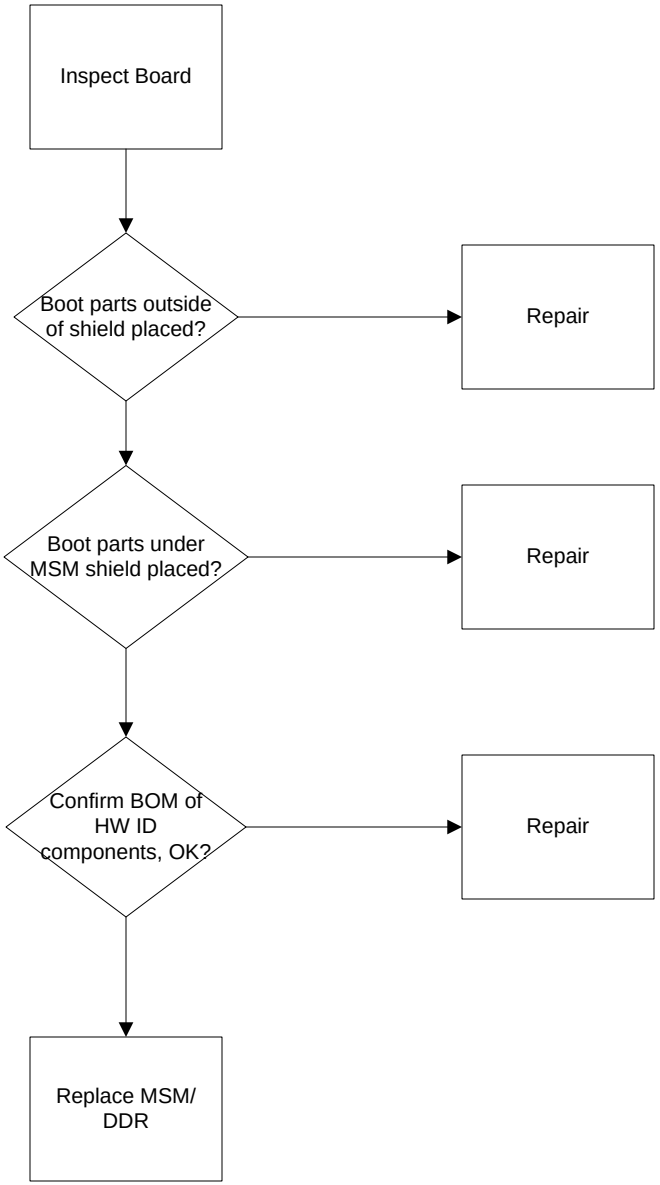

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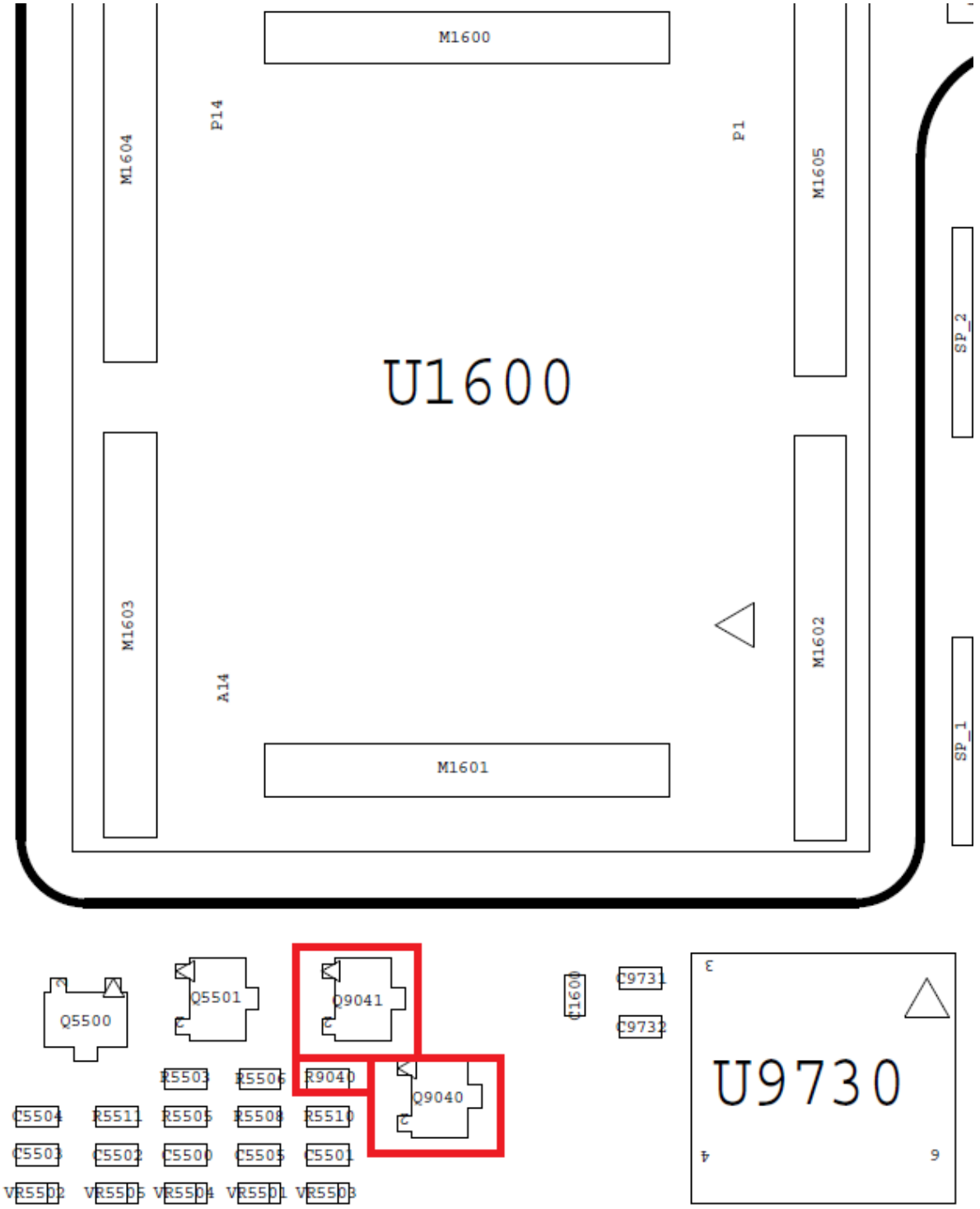

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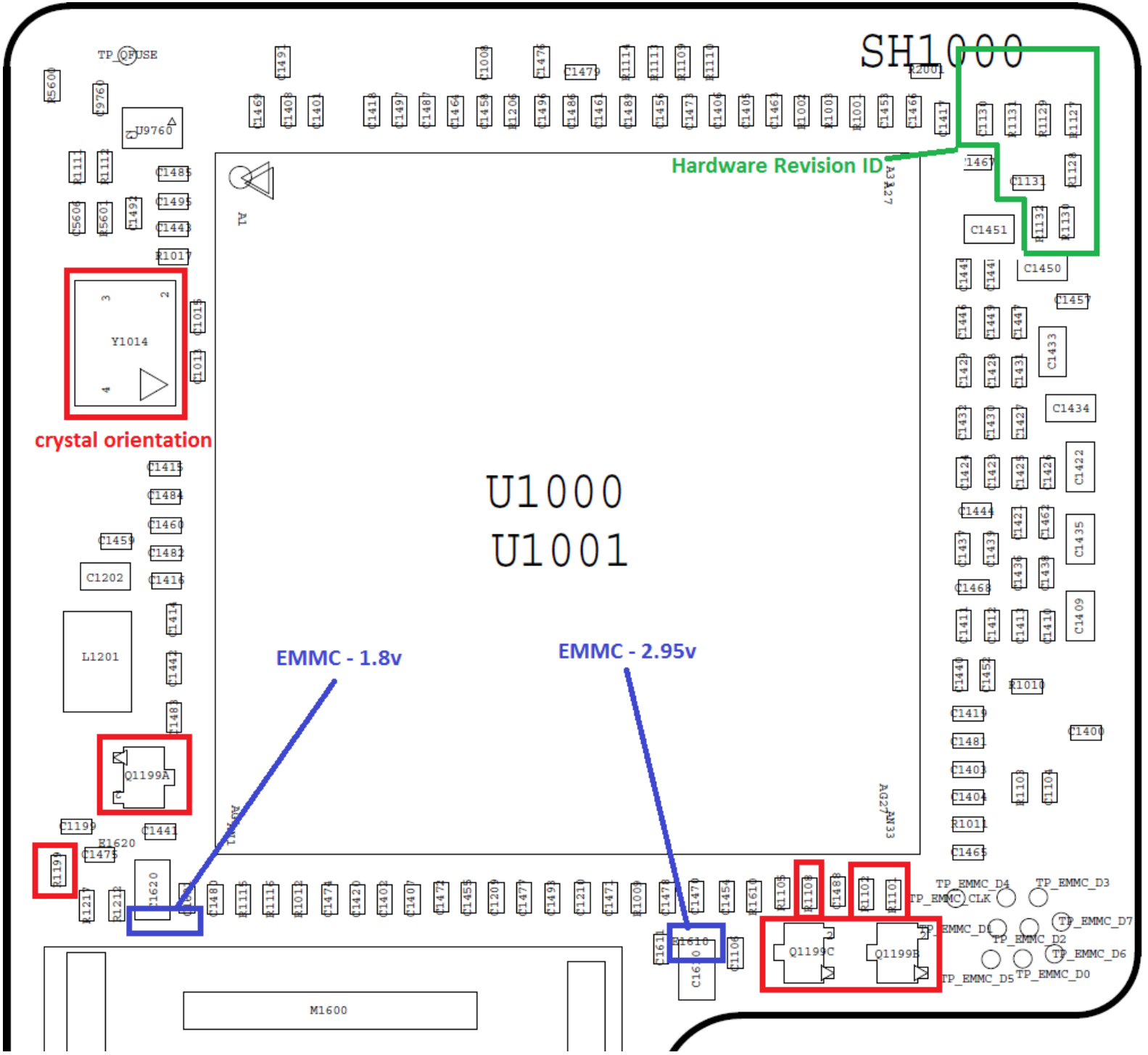

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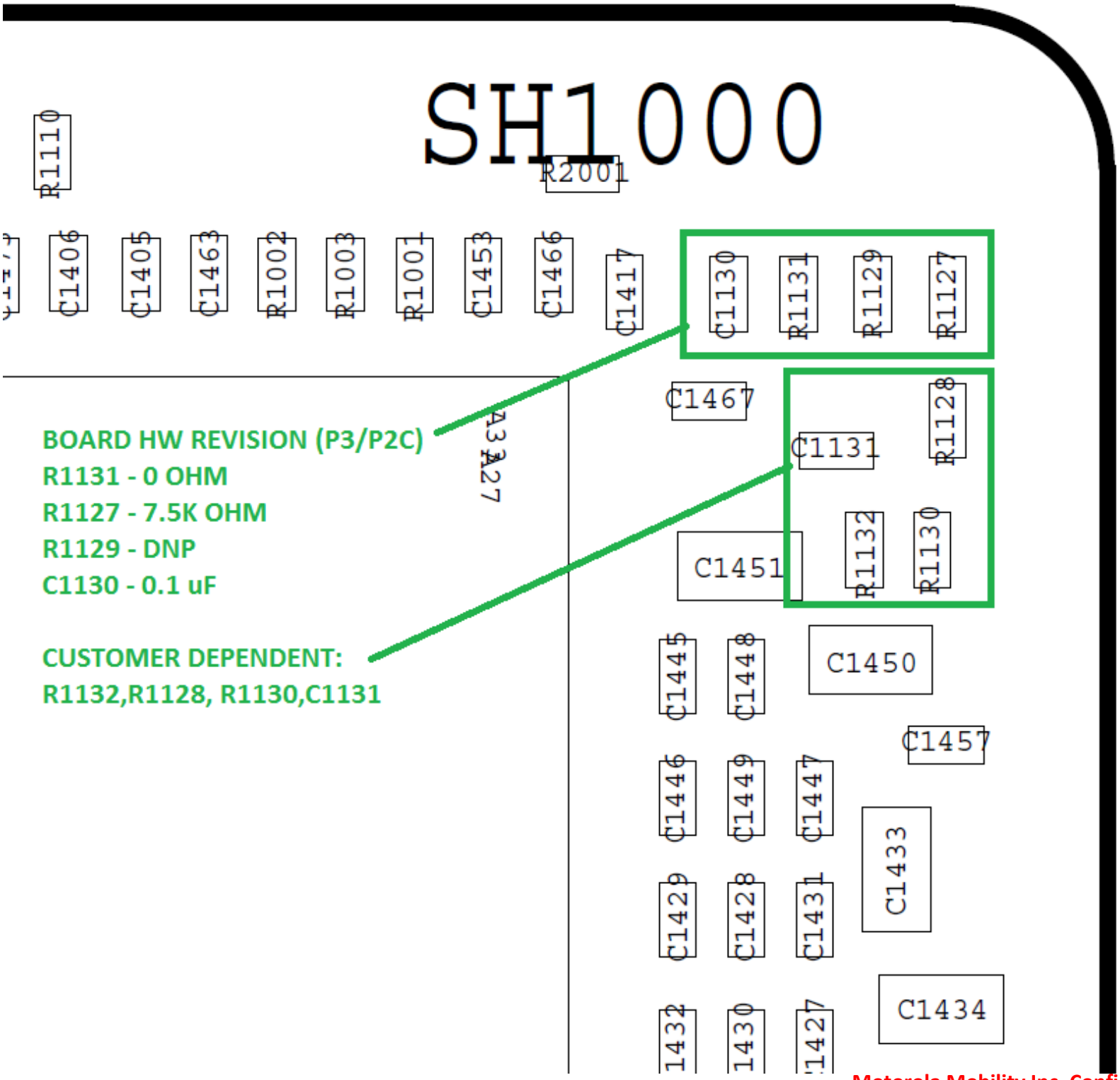

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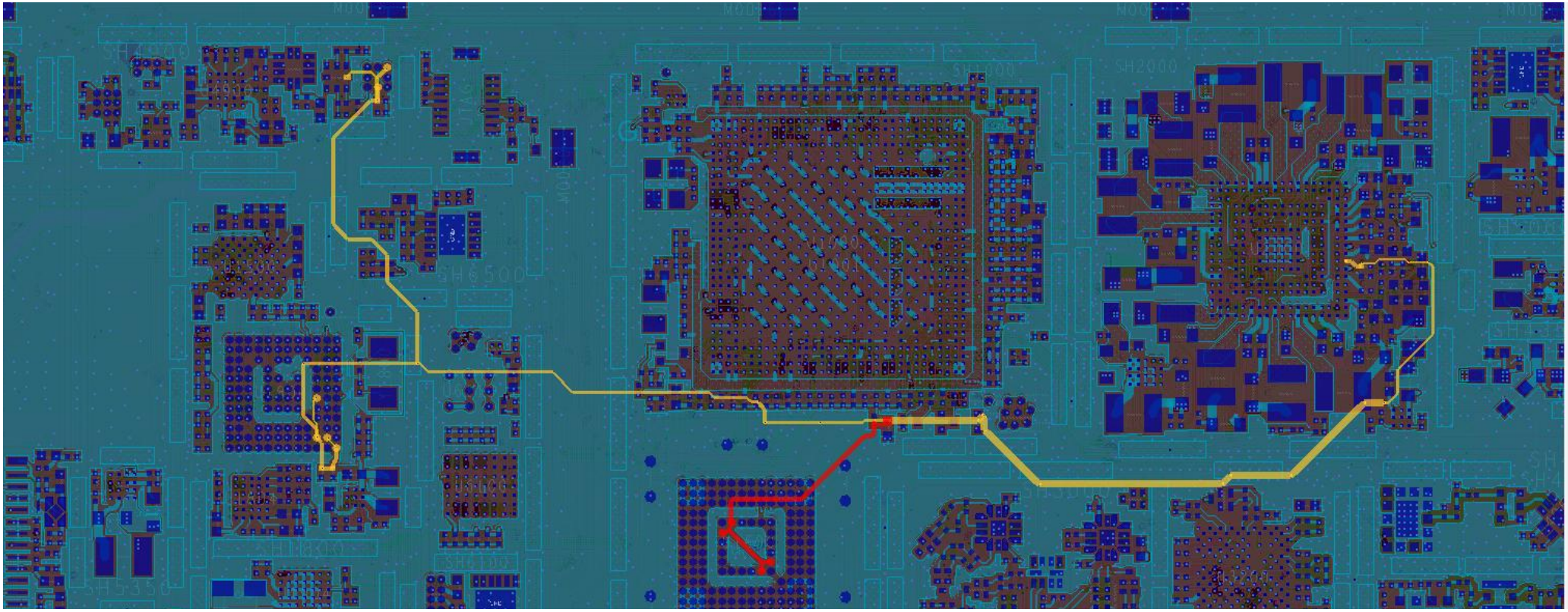
VREG_L5 Routing



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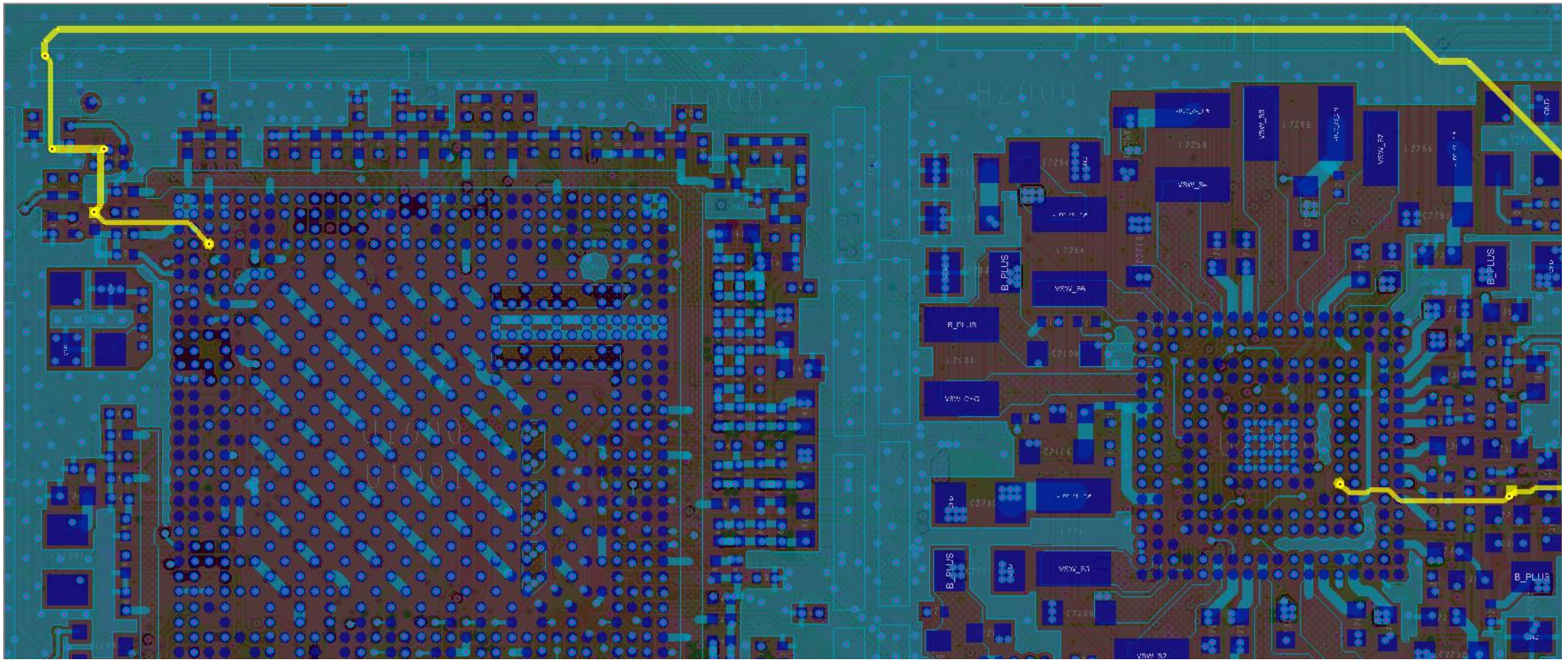
VREG_L3 Routing



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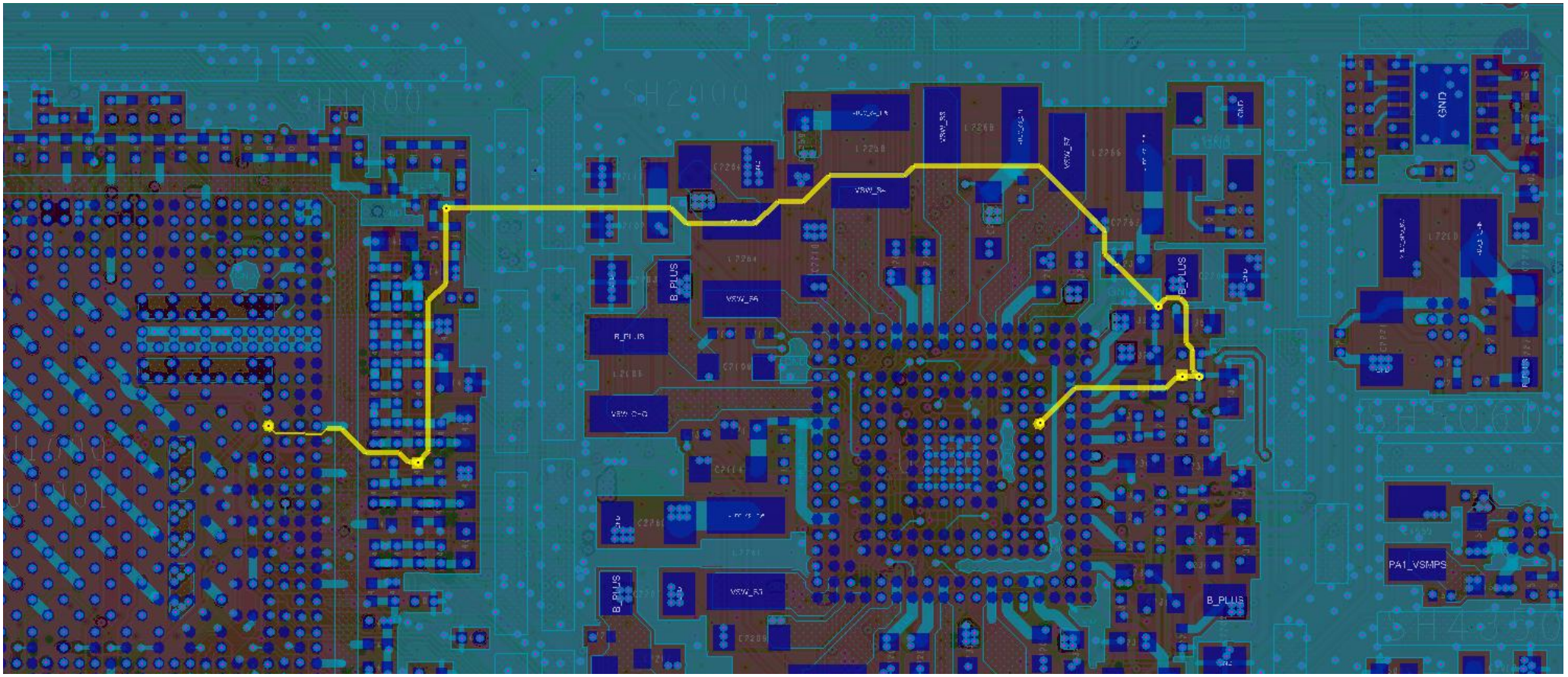
VREG_L7 Routing



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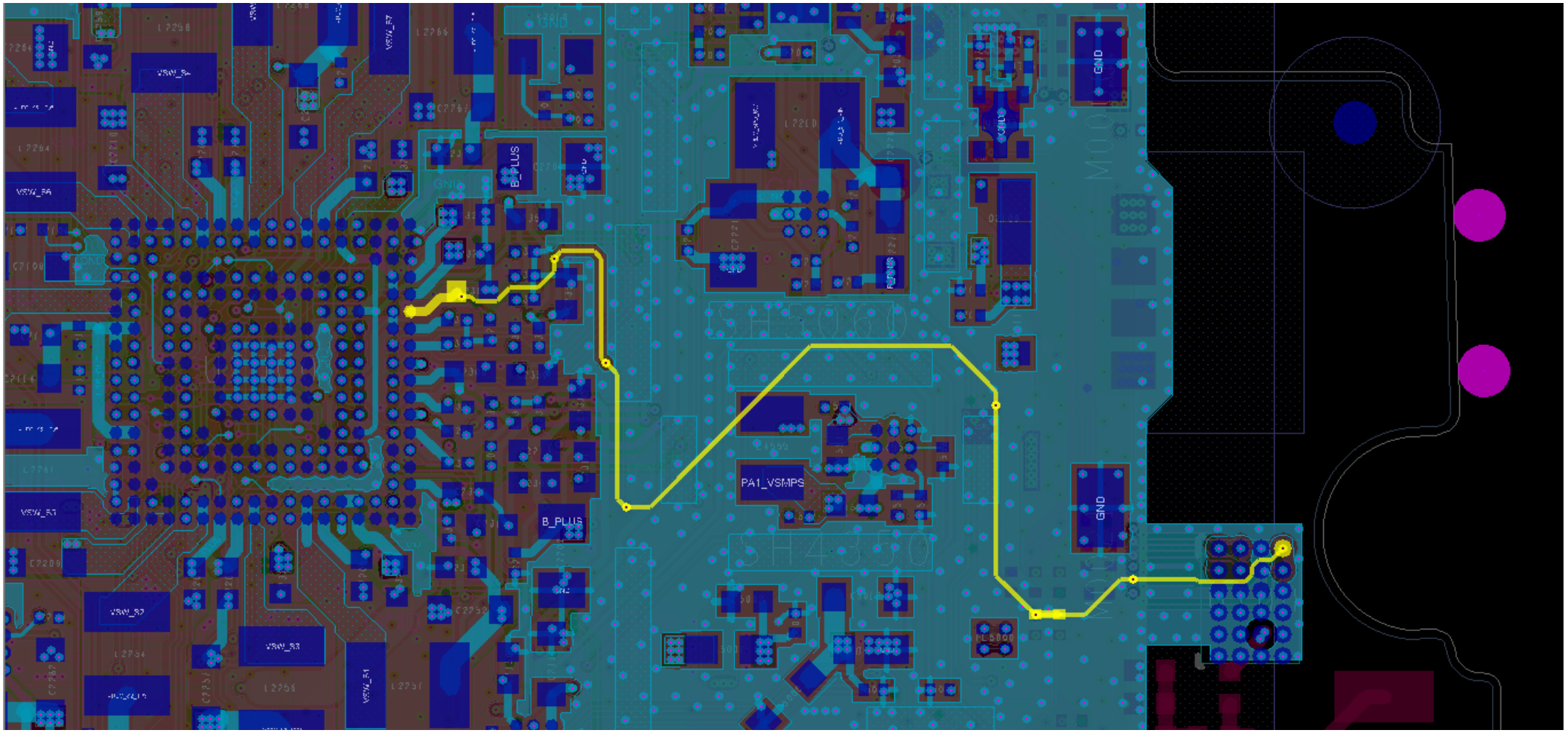
VREG_L6 Routing



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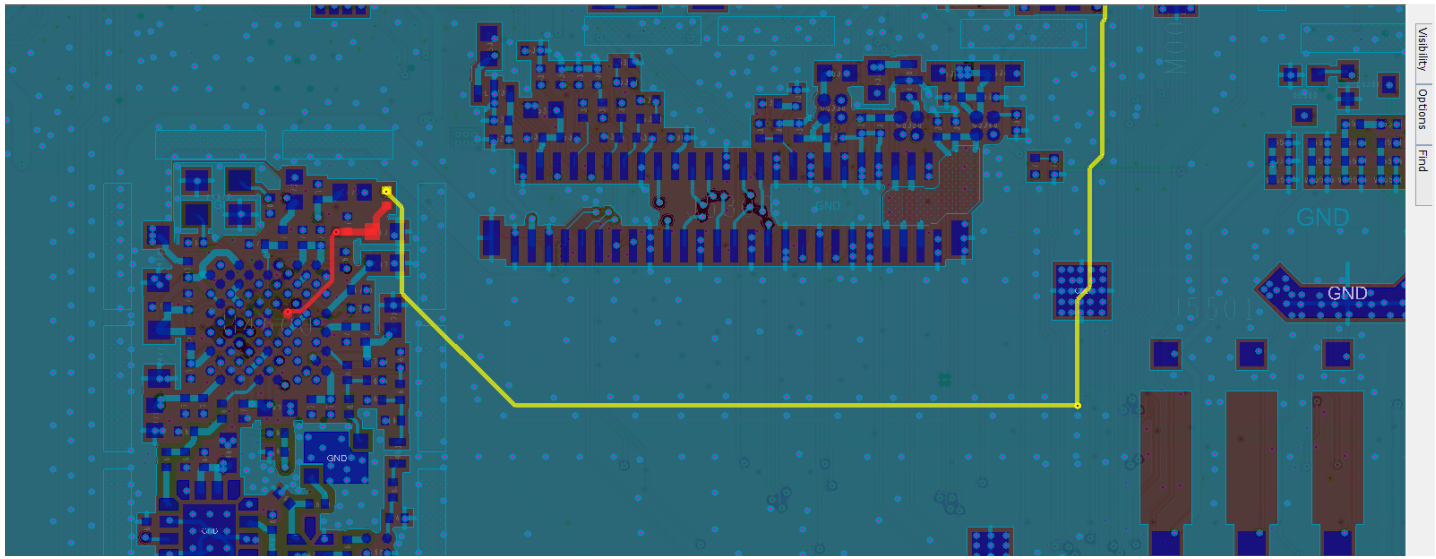
VREG_L4 Routing



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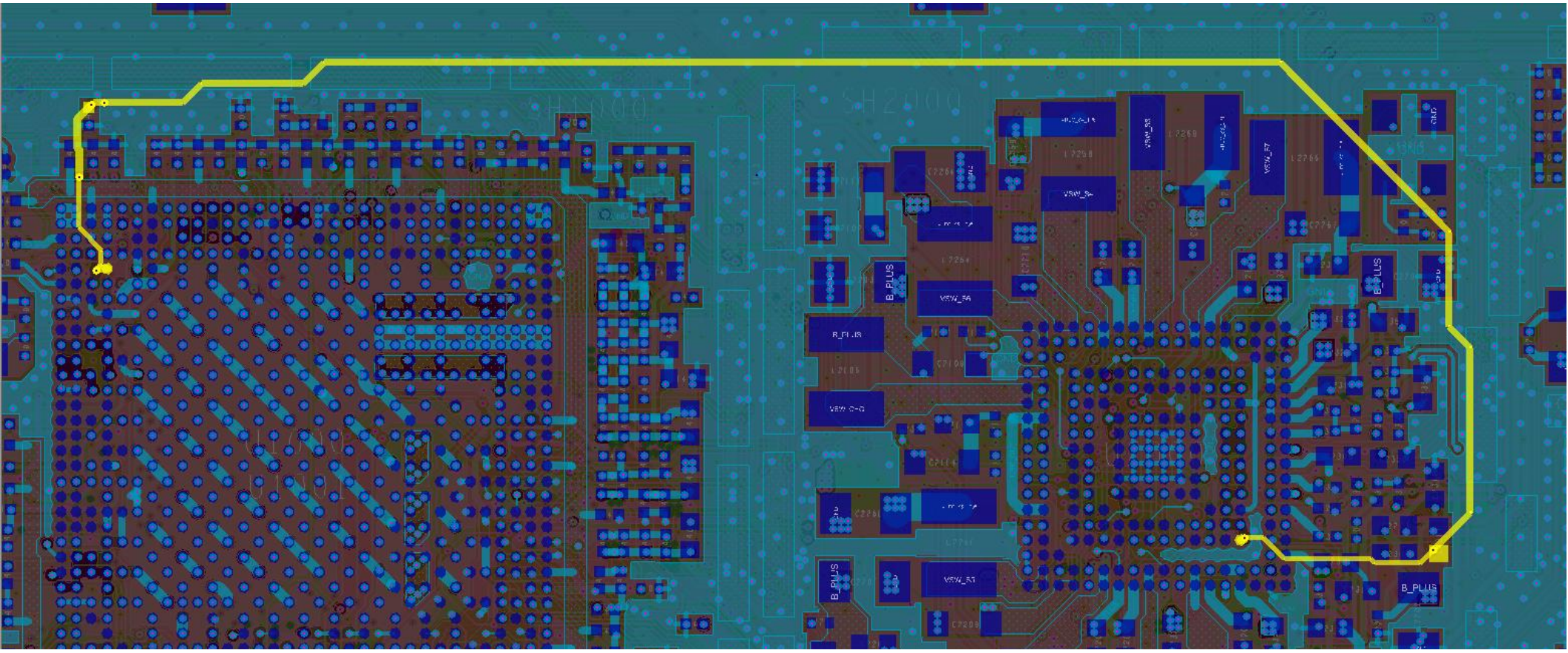
VREG_L1 Routing



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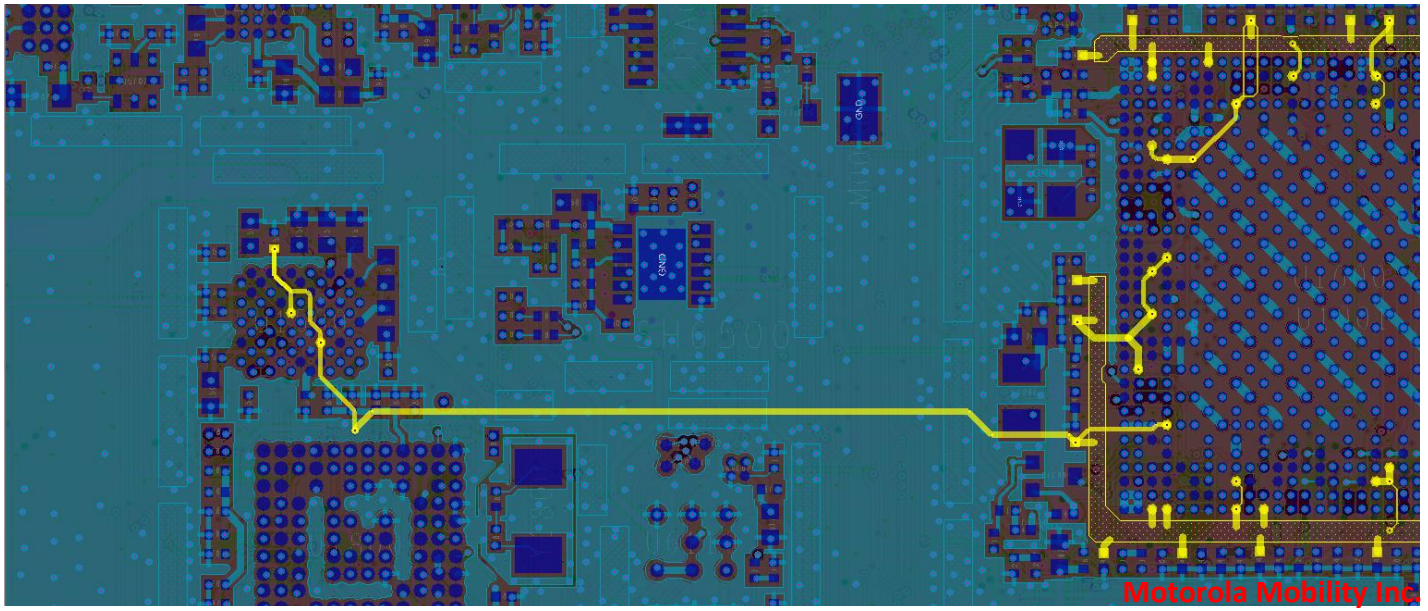
VREG_L25 Routing



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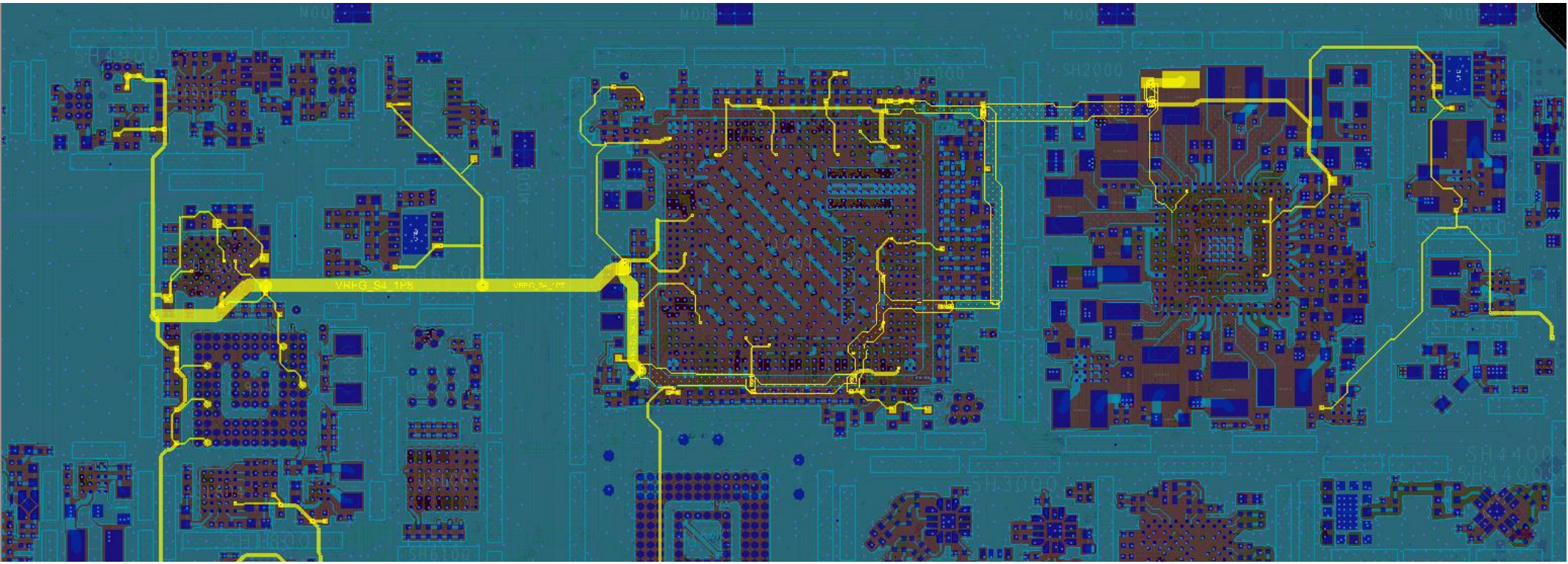
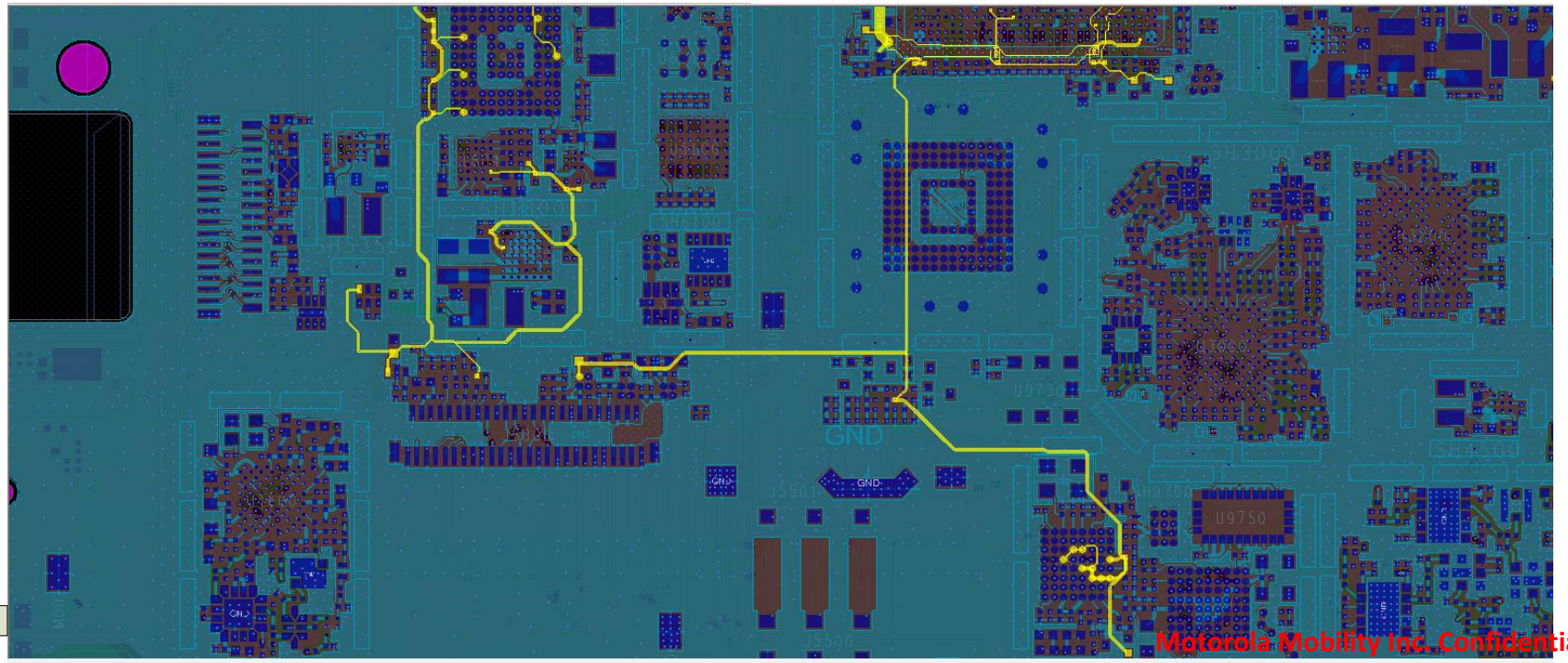


VREG_S4 Routing



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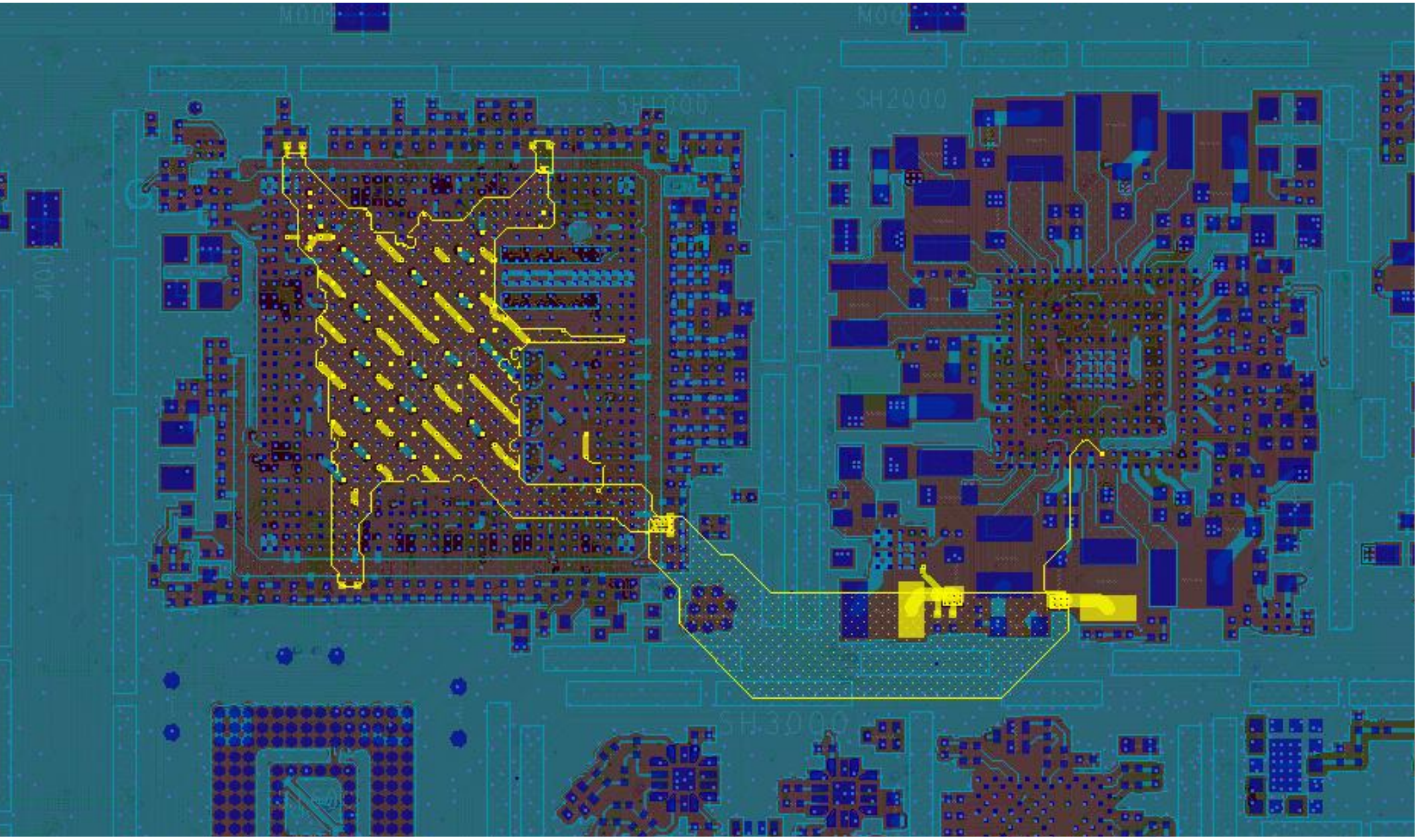
VREG_S3 Routing



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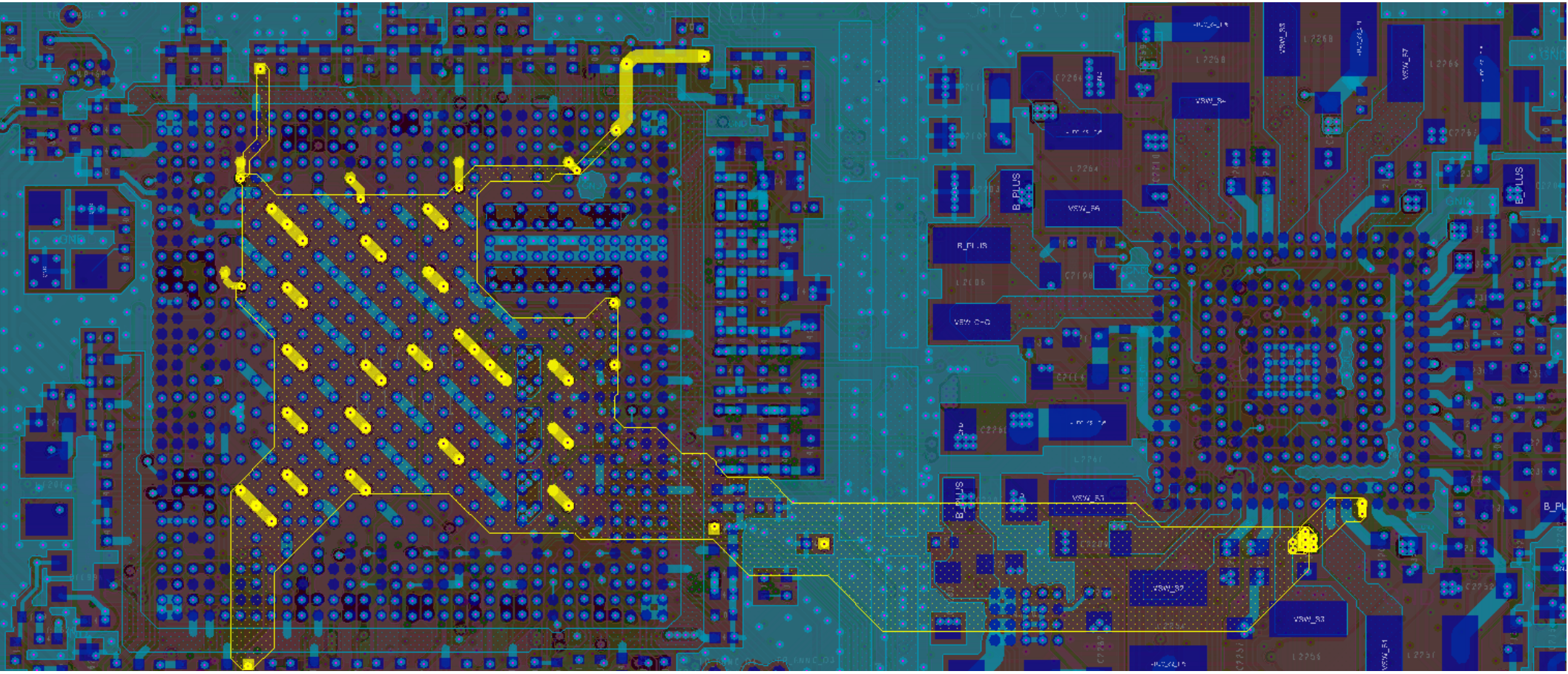
VREG_L24 Routing



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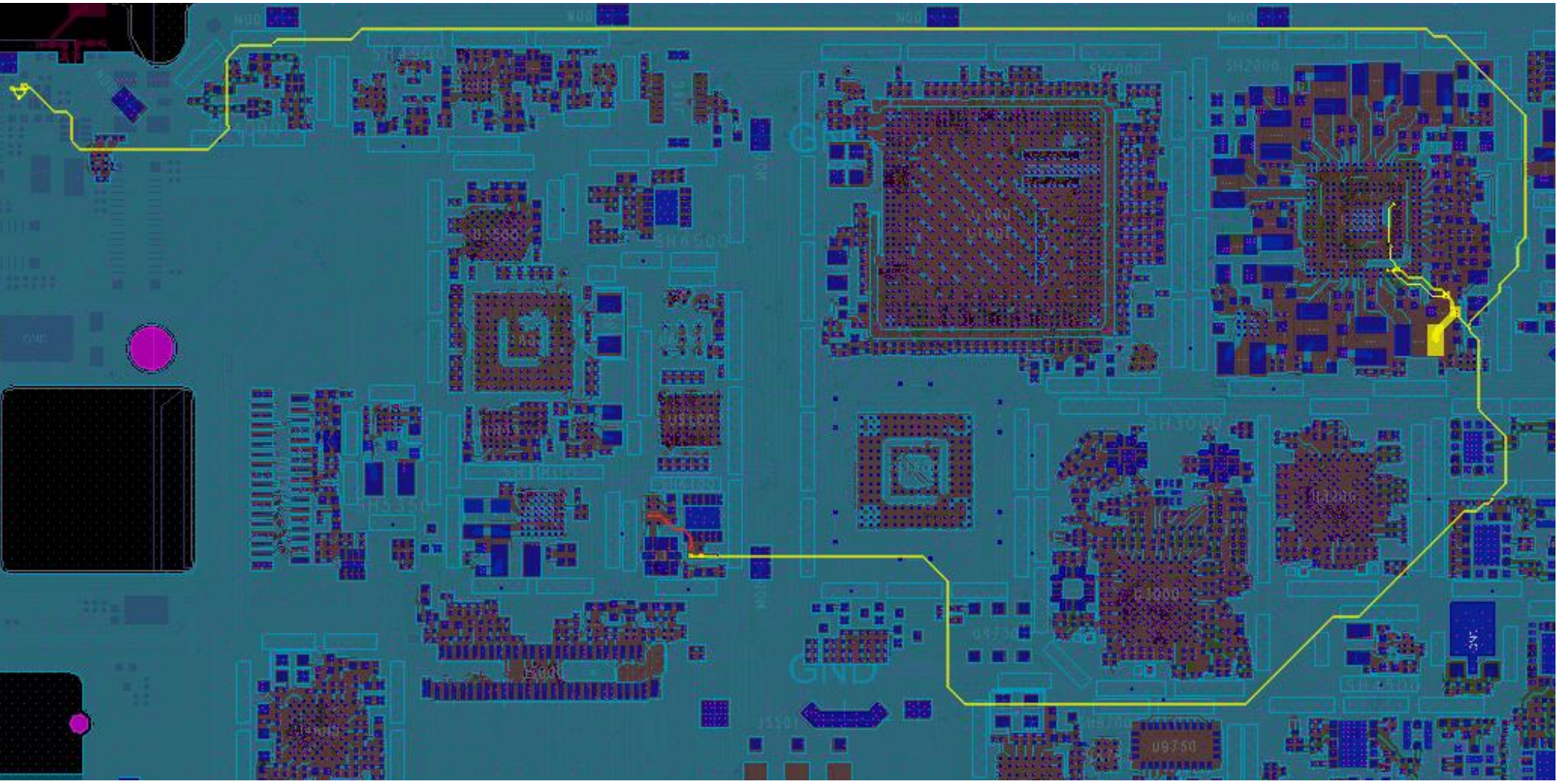
VREG_S1 Routing



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