



T600/T500 Scrub Controller Board

Changelog:

REV A--Initial concept.

REV B--Eliminate contactor driver and precharge.
--Q25058-001 Mule boards.

REV C--Change TVS on wand pump driver.
--Q25058-002 P1.5 boards.
--Delete MODEM_IN_RANGE signal from main micro.
--Add new multivibrator U78 for vac drive.
--Change bias pullups on current amps to 560K.
--Change gate drive resistors on half and full bridge drivers to 10 ohms,.

REV D--Change connection of Vbat pin to Vdd. Q25058-003 P2.5 board.
--R175 increased to 1K for more ESD protection.
--Change L1 to a larger size.
--Replace U42 with higher current part.
--Replace wand pump driver with higher 16A cpability driver.
--Some TVS diodes were 45V, some were 48V. Change them all to 48V in anticipation of using this board in a 36V machine.
--Add RC filter to SHUNT_CURRENT and SHUNT_REFERENCE.
--Add 470uF bulk capacitor to WAND_PUMP_HIGH.
--Add capacitor on I-drive enable output.

REV E--Q25058-003 Prod boards same PCB as P2.5..
--Update DNI items for generating production BOM.

REV F--Populate C434 with 150pF..

REFERENCE SCHEMATIC Q26008-001

Paraguay Changes: Q26033-001

REV A -

- REV BITS on both micros set to 010.
- Bulk Capacitors set to 63V capacity with same footprint
- TVS diodes verified to support higher VBATT
- Resistors changed to accomodat higher VBATT:
 - R192 124K -> 169K
 - R199 44.2K -> 66.5K
 - R171 200K -> 267K

Paraguay Changes: Q26033-002

REV A -

- REV BITS on micro U64 set to 011
- Added note to place Ground lines around RESET_DRIVERS line to remove coupling issues.
- Changed

All Half and full bridges Rg from 10ohm to 3ohm.
All Half and full bridges Cgs for top FETs to DNI.
All Reset Driver lines changed from 100kohms to 1kohms with 0.1uf capacitance to ground.
Reset Driver Pull up resistor from 1K to 250 ohms with 0.1uf capacitance to ground.

(REFERENCE ONLY) PCA VARIANTS:
STANDARD NO TELEMETRY 1229861
WITH TELEMETRY POPULATED 1229859

REFERENCE ONLY BOM ITEMS:

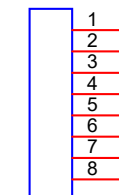
- ☐ MAIN FIRMWARE - U64 Q30067-00X
(U64 SAME FIRMWARE TELEMETRY
VS. STANDARD VERSIONS)
- ☐ TELEMETRY FIRMWARE - U72 Q30076-00X
- ☐ WIFI FIRMWARE - U54 N/A
- ☐ PCB Q25058-004
- ☐ SCHEMATIC Q26033-002

LAYOUT FEATURES:

CORNER MOUNTING HOLES

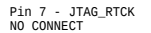
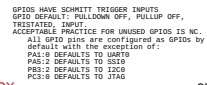
MH1 MH5 MH6 MH3 MH4 MH2

HEATSINK MOUNTING HOLES

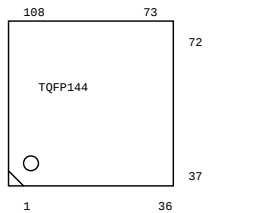
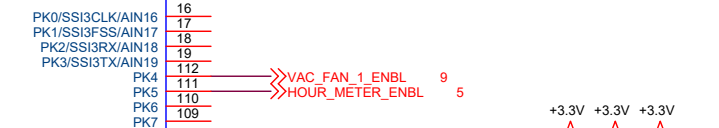
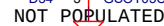


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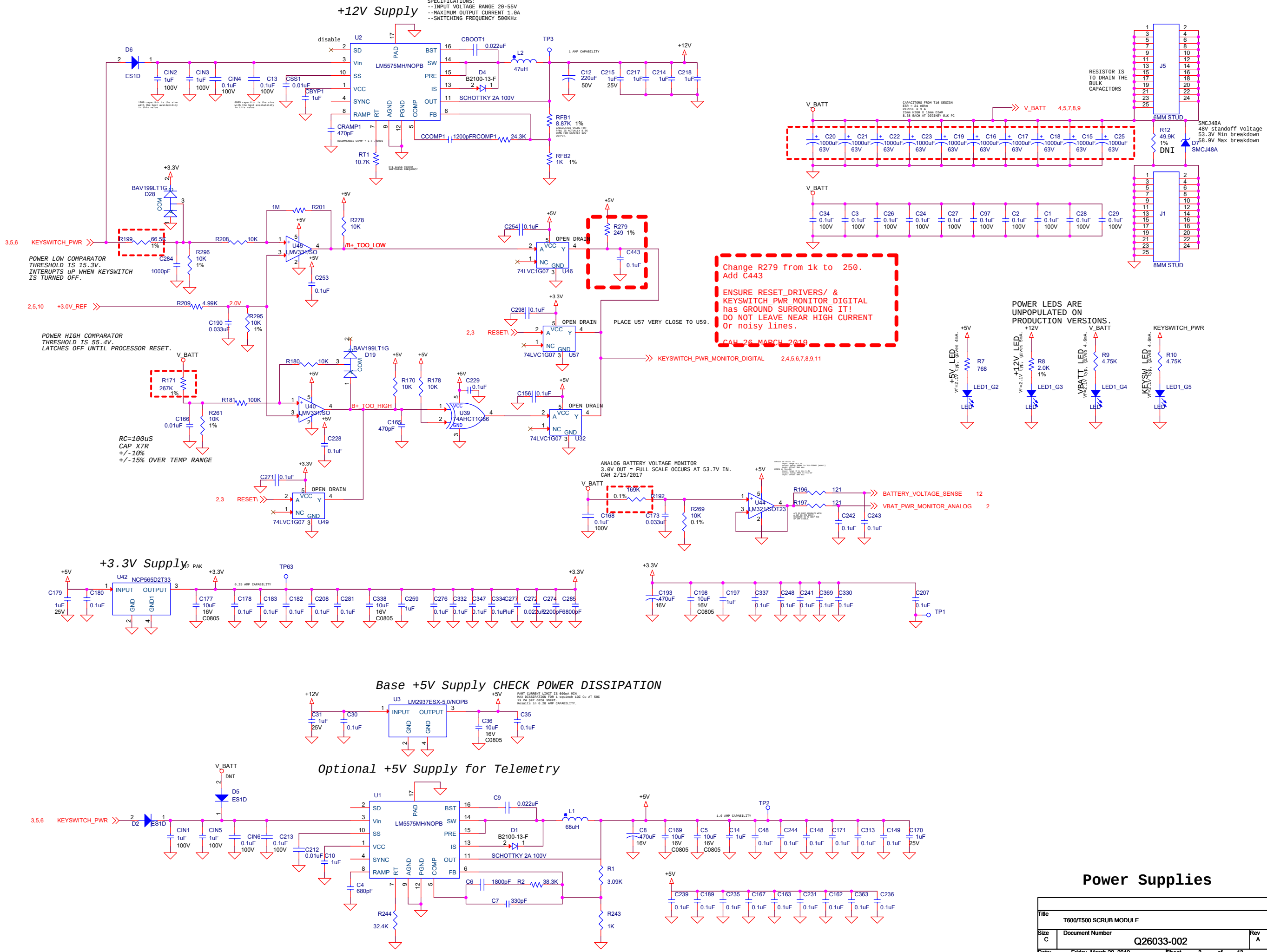
DNI
FOR
PRODUCTION



ELECTROSTATIC DISCHARGE PROTECTION
over operating free-air temperature range
PARAMETER TEST CONDITIONS VALUE
IEC Contact Discharge IEC 61000-4-2 Bus terminals vs GND ± 6 kV
Human Body Model JEDEC Standard 22, Test Method A114-C.01 Bus terminals vs GND ± 8 kV
Field-Induced-Charged Device Model JEDEC Standard 22, Test Method C101 All pins ± 5 kV
Machine Model ANSI/ESD5.2-1996 ± 200 V



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Power Supplies

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Replace R23 position with C444 and tie U10 Pin 1 to U5 Pin 13. This is to help with layout. Change R16 from 100k to 1k.

ENSURE RESET_DRIVERS/ & KEYSWITCH_PWR_MONITOR_DIGITAL has GROUND SURROUNDING IT! DO NOT LEAVE NEAR HIGH CURRENT or noisy lines.

CAH 26 MARCH 2019

Replace R23 position with C444 and tie U10 Pin 1 to U5 Pin 13. This is to help with layout. Change R16 from 100k to 1k.

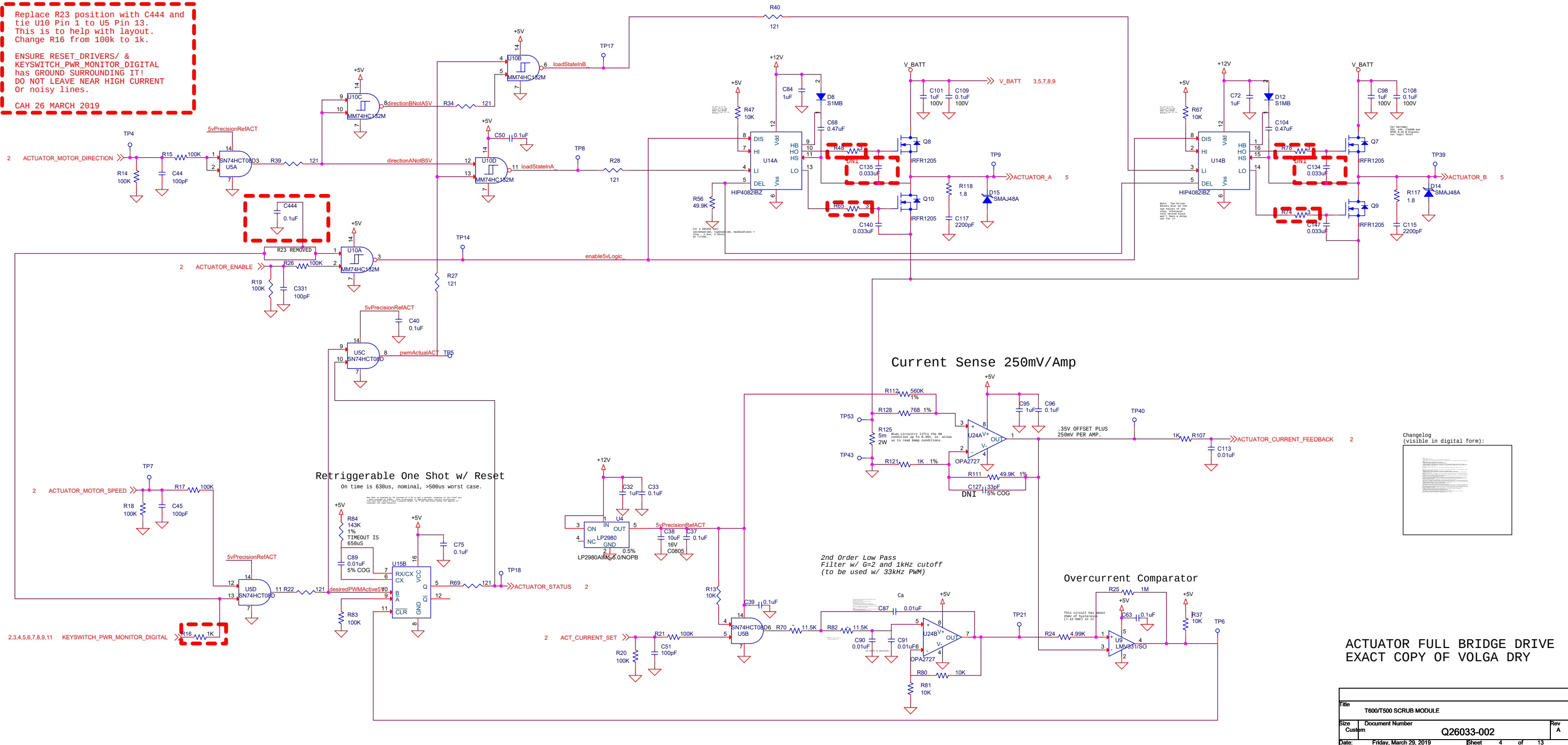
ENSURE RESET_DRIVERS/ & KEYSWITCH_PWR_MONITOR_DIGITAL has GROUND SURROUNDING IT! DO NOT LEAVE NEAR HIGH CURRENT or noisy lines.

CAH 26 MARCH 2019

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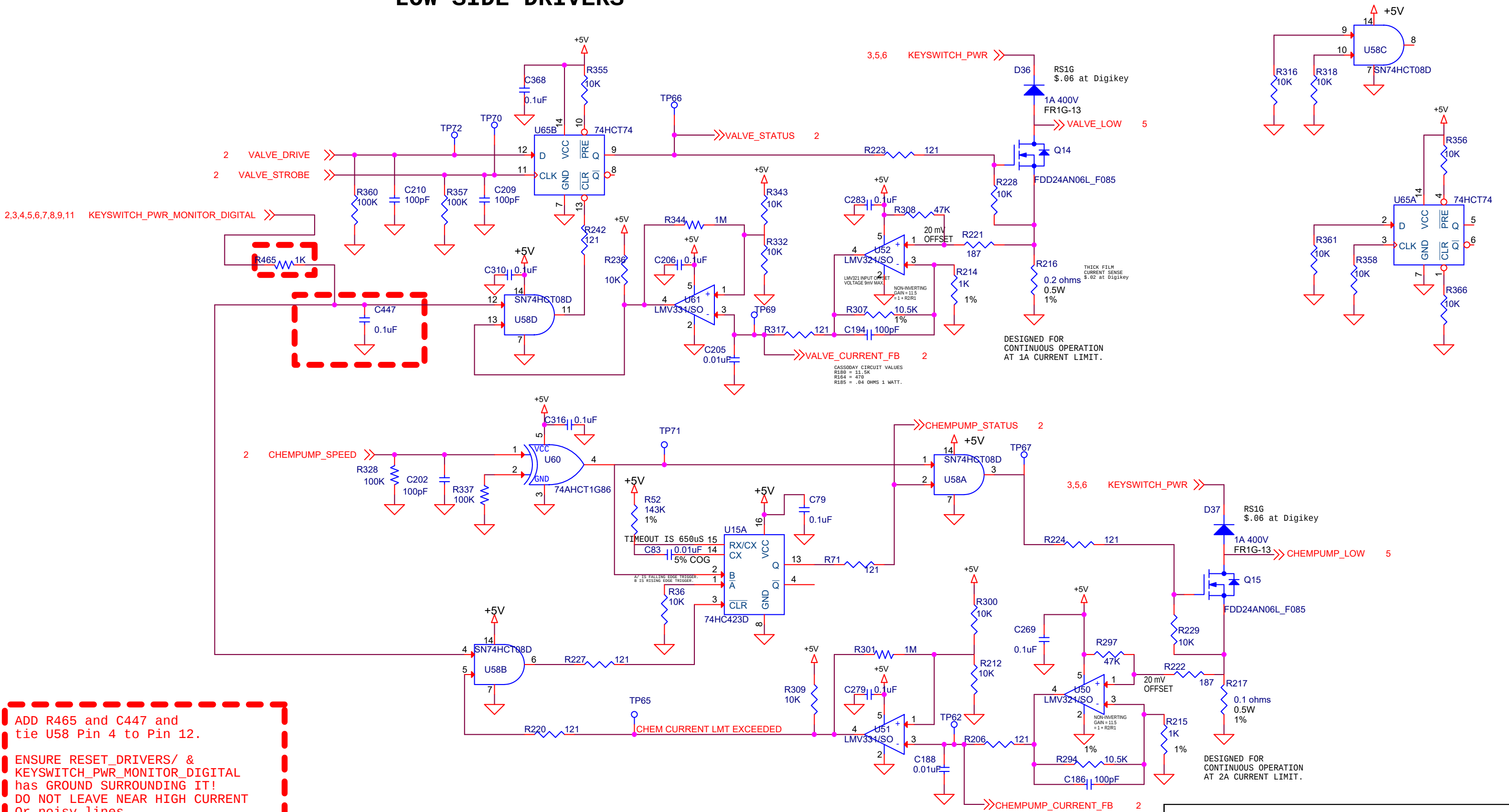
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ACTUATOR FULL BRIDGE DRIVE
EXACT COPY OF VOLGA DRY

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LOW SIDE DRIVERS



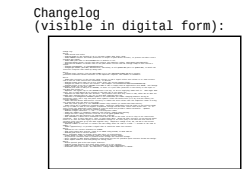
- ADD R465 and C447 and
tie U58 Pin 4 to Pin 12.
- ENSURE RESET_DRIVERS/ &
KEYSWITCH_PWR_MONITOR_DIGITAL
has GROUND SURROUNDING IT!
DO NOT LEAVE NEAR HIGH CURRENT
Or noisy lines.
- CAH 26 MARCH 2019

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SCRUB_1_ENBL

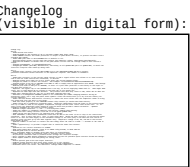
R49
100K



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ENSURE RESET_DRIVERS/ &
KEYSWITCH_PWR_MONITOR_DIGITAL
has GROUND SURROUNDING IT!
DO NOT LEAVE NEAR HIGH CURRENT
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R68 WAS here
Use spot for C441
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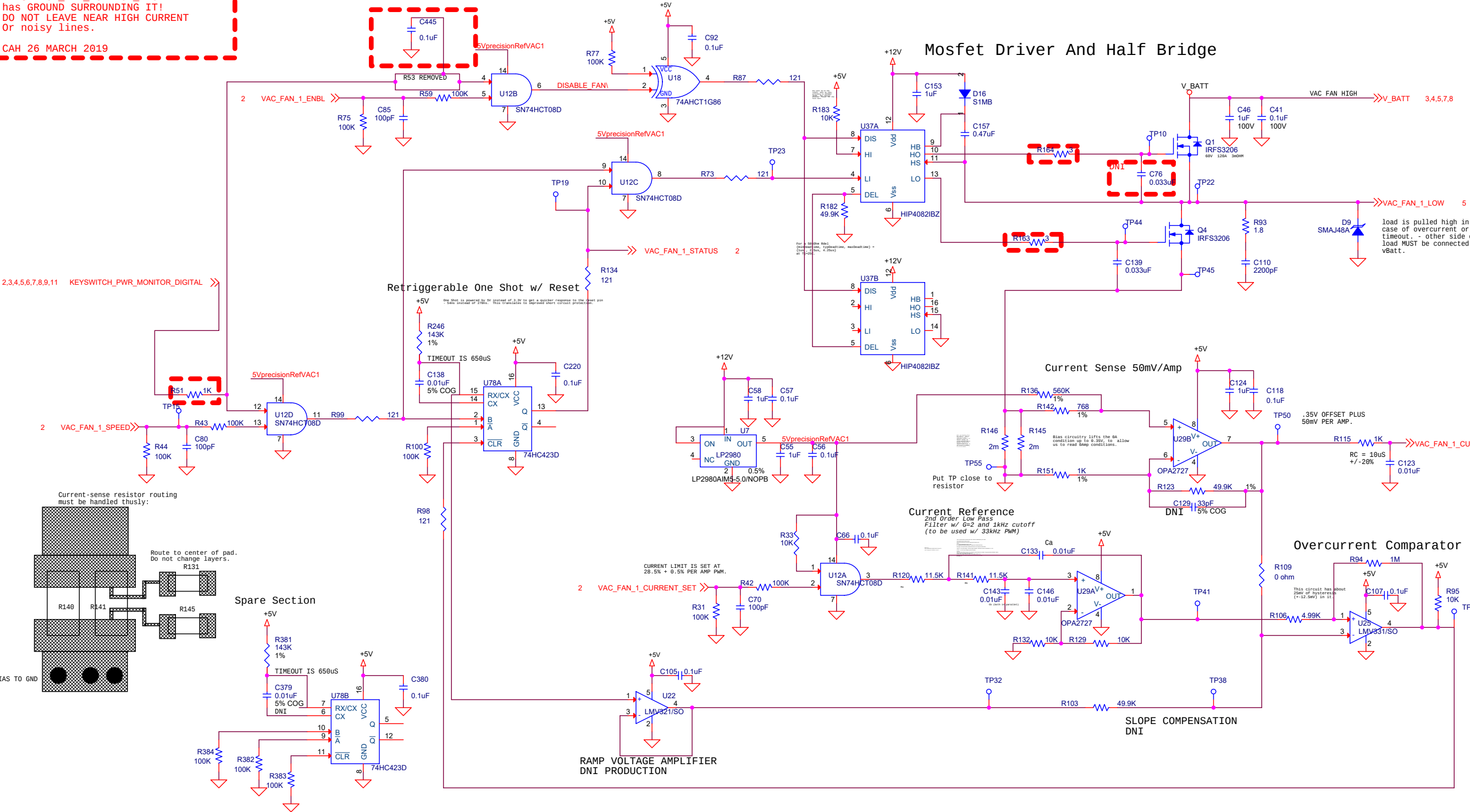
[LEFT SCRUB MOTOR]

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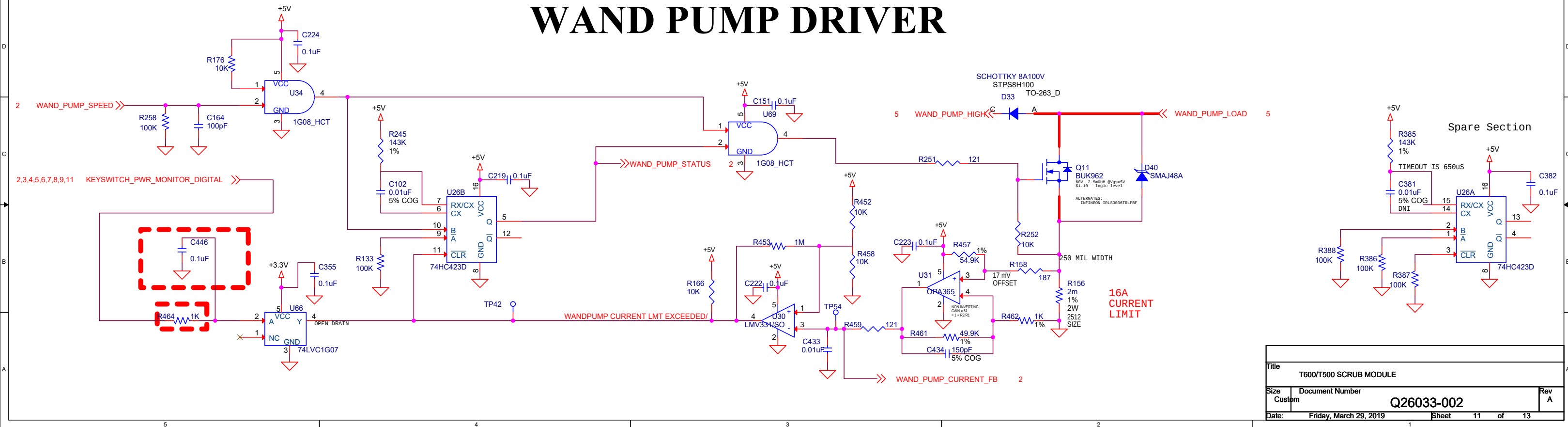
Replace R53 position with C445 and tie U12 Pin 4 to Pin 12.
This is to help with layout.
Change R51 from 100k to 1k.

ENSURE RESET_DRIVERS/ & KEYSWITCH_PWR_MONITOR_DIGITAL has GROUND SURROUNDING IT!
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WAND PUMP DRIVER

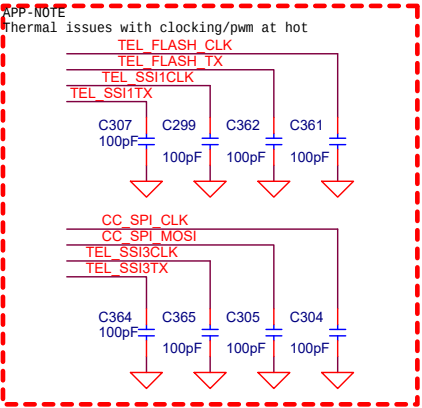


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GPIOs HAVE SCHMITT TRIGGER INPUTS
GPIO DEFAULT: PULLDOWN OFF, PULLUP OFF,
TRISTATED, INPUT.
ACCEPTABLE PRACTICE FOR UNUSED GPIOs IS NC.
All GPIO pins are configured as GPIOs by
default with the exception of:
PA1:8 DEFAULTS TO UART0
PA5:2 DEFAULTS TO SS10
PB3:2 DEFAULTS TO I2C0

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JTAG

ALL COMPONENTS THIS PAGE:
ONLY POPULATED ON
CELLMODEM VARIANT .

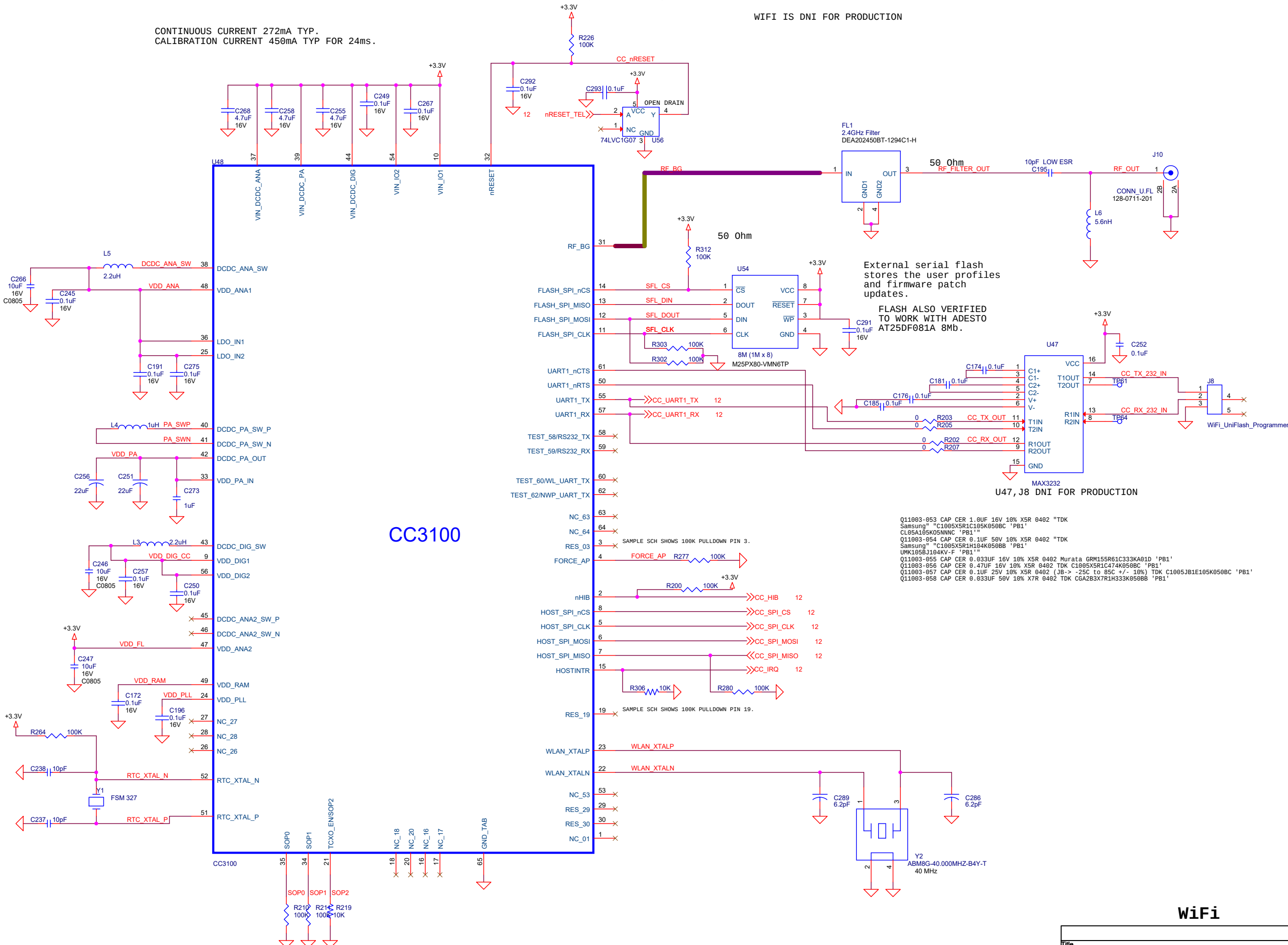
Telemetry Processor

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MAIN SCRUB WIFI

WIFI IS DNI FOR PRODUCTION

CONTINUOUS CURRENT 272mA TYP.
CALIBRATION CURRENT 450mA TYP FOR 24ms



WiF:

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