# STM32G474E-EVAL

## MB1397

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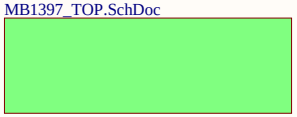
Sheet 19: Multi-Function Expander

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U_MB1397_TOP
MB1397_TOP.SchDoc



## Legend

General comment such as function title, configuration, ...

Text to be added to silkscreen.

Warning text.

Notes to generate the board layout.

## OPEN PLATFORM LICENSE AGREEMENT

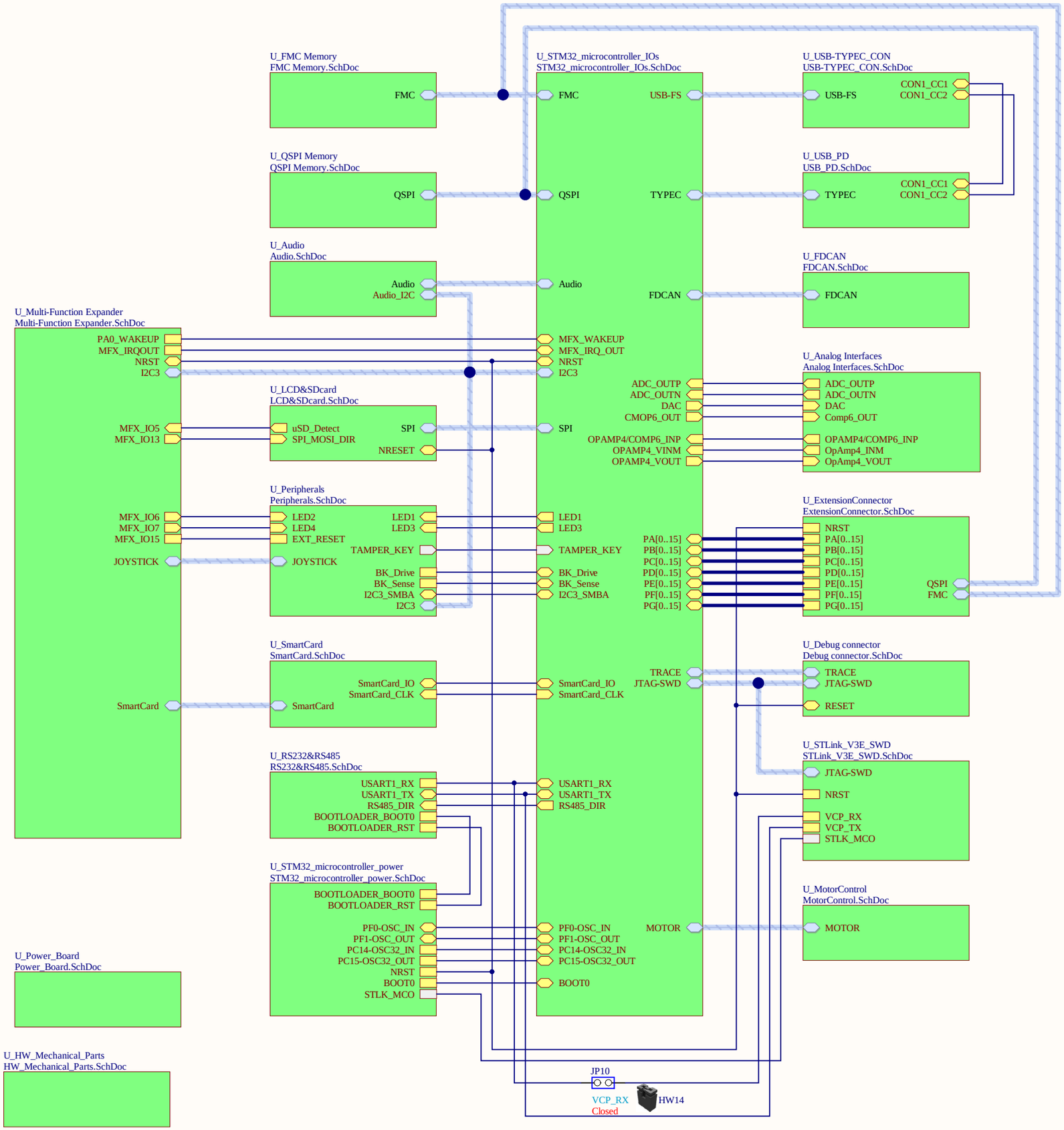

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| | | |
|---|---|---|
| Title: **Project overview** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 1 of 22 |

life.augmented

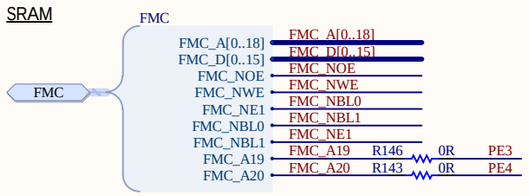



| | | |
|---|---|---|
| Title: **MB1397 TOP** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A3 | Date: 01-NOV-18 | Sheet: 2 of 22 |

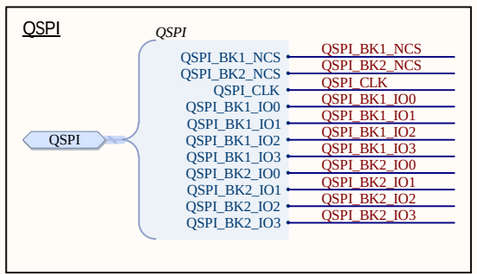
life.augmented

# STM32G474QET6 MCU I/Os

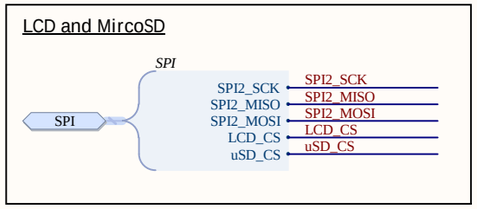
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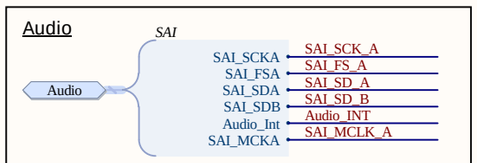

## QSPI



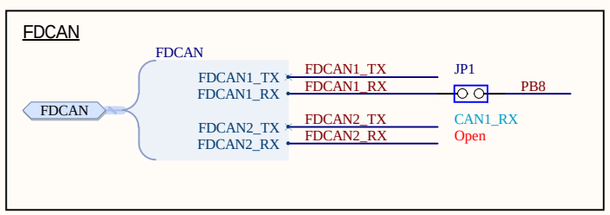

## LCD and MircoSD



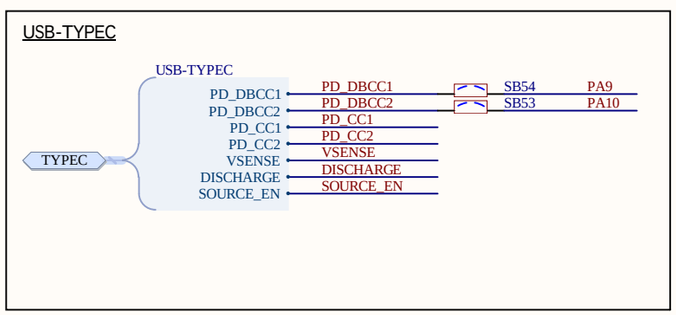

## Audio



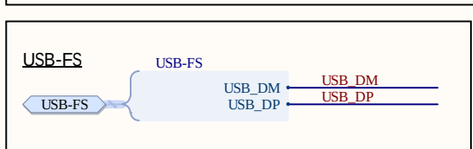

## FDCAN

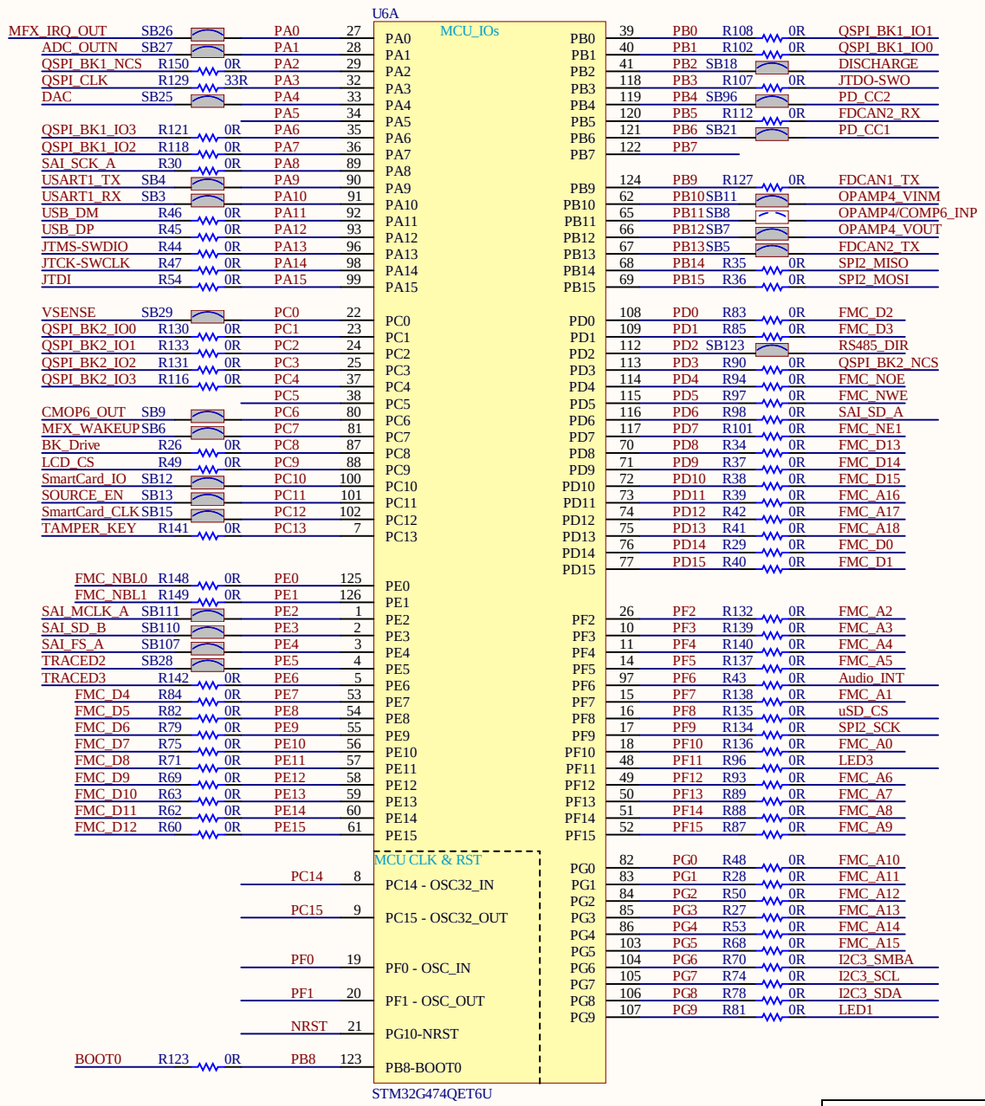



## USB-TYPEC

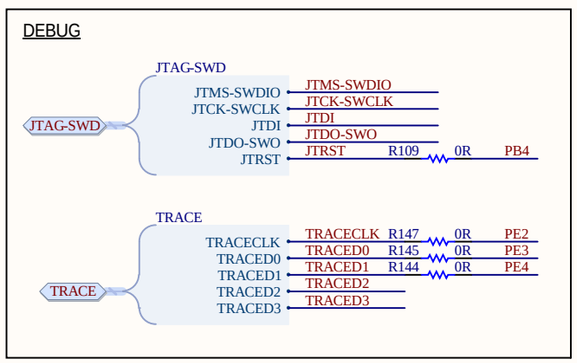



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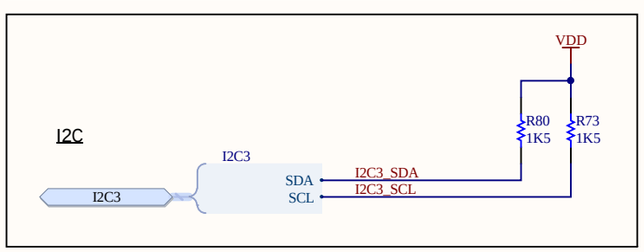


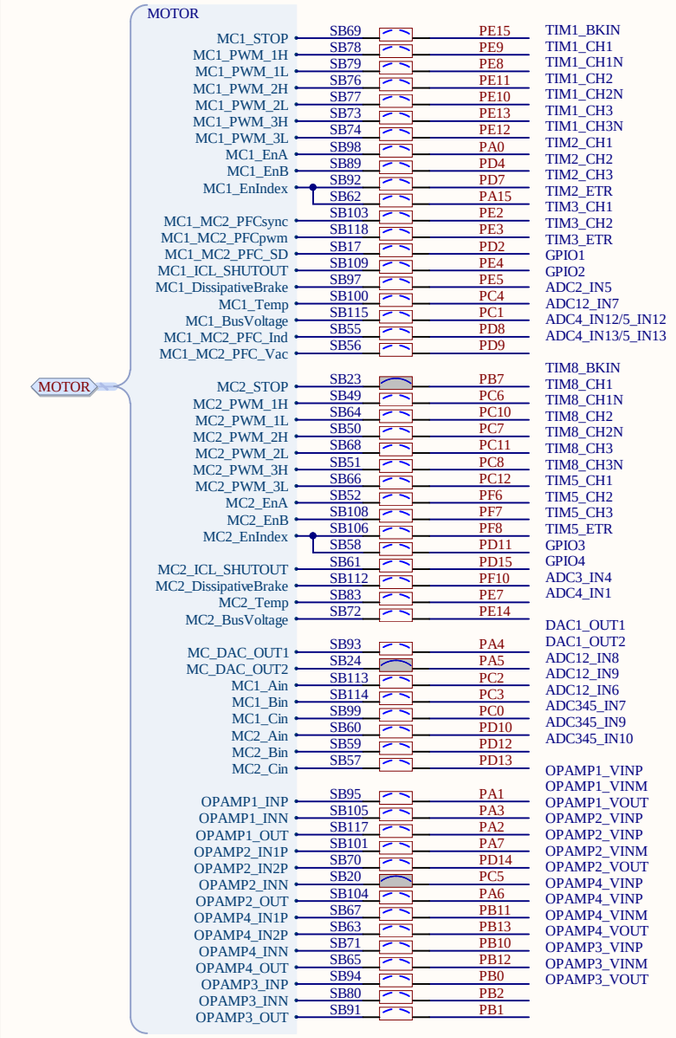

## DEBUG



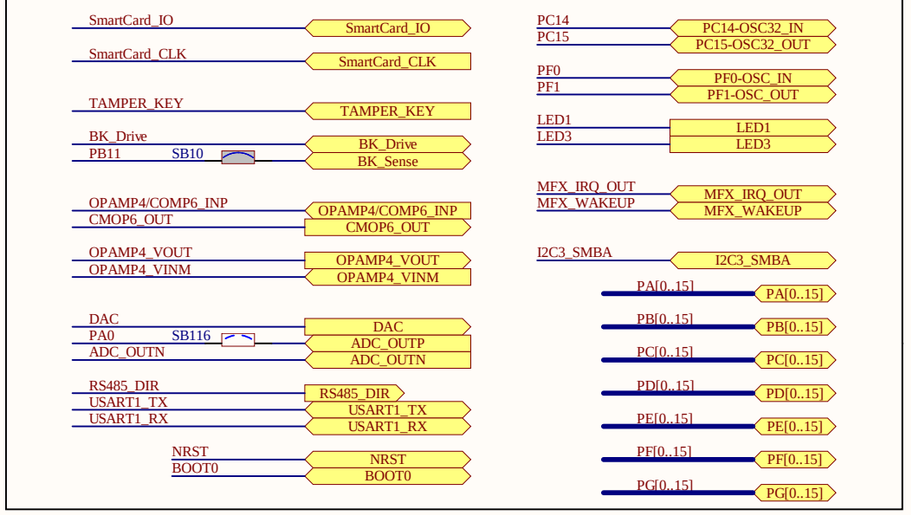

## I2C




## DUAL MOTOR




## PORT

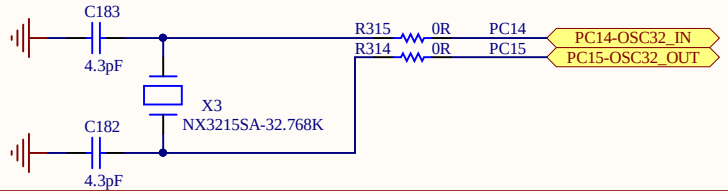



| | | |
|---|---|---|
| Title: **STM32_microcontroller_IOs** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A3 | Date: 01-NOV-18 | Sheet: 3 of 22 |

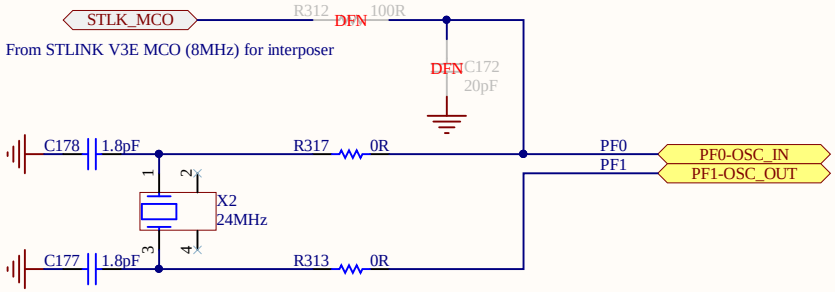
life.augmented

# MCU POWER, CLOCK, RESET & BOOT

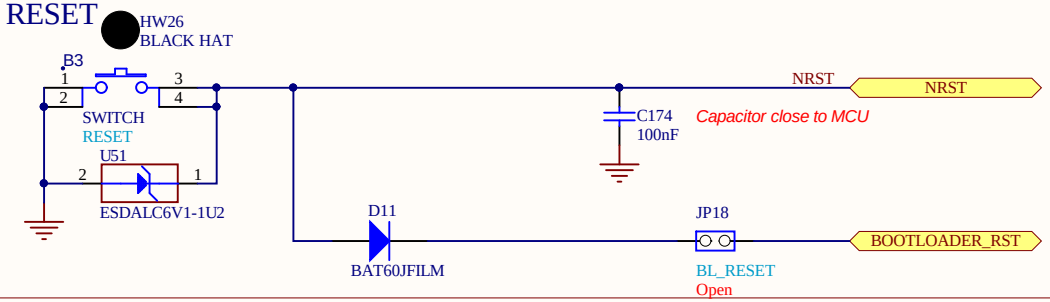
## 32kHz Clock



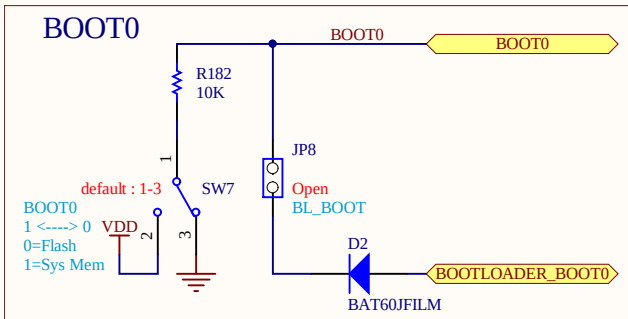

## 24MHz Clock



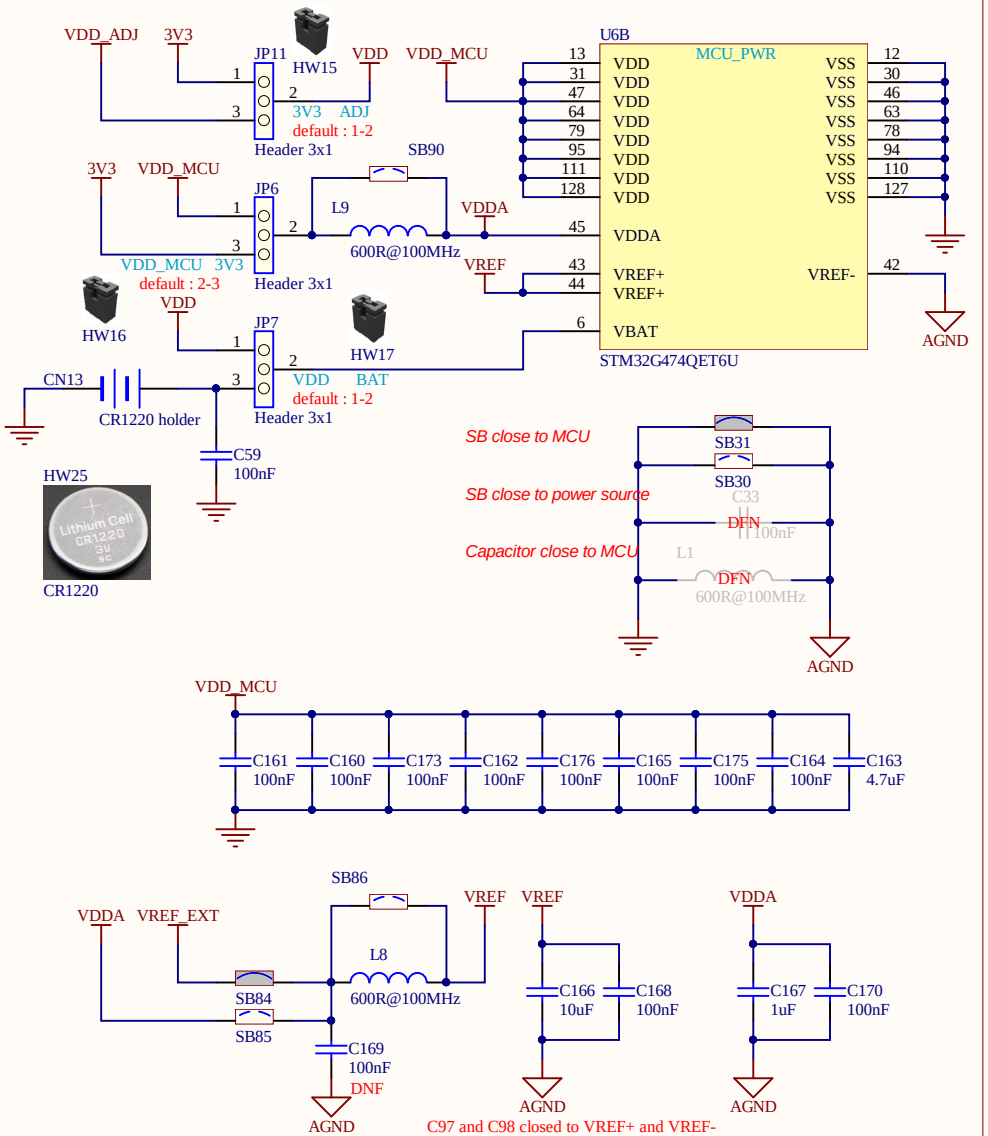

## RESET




## BOOT0



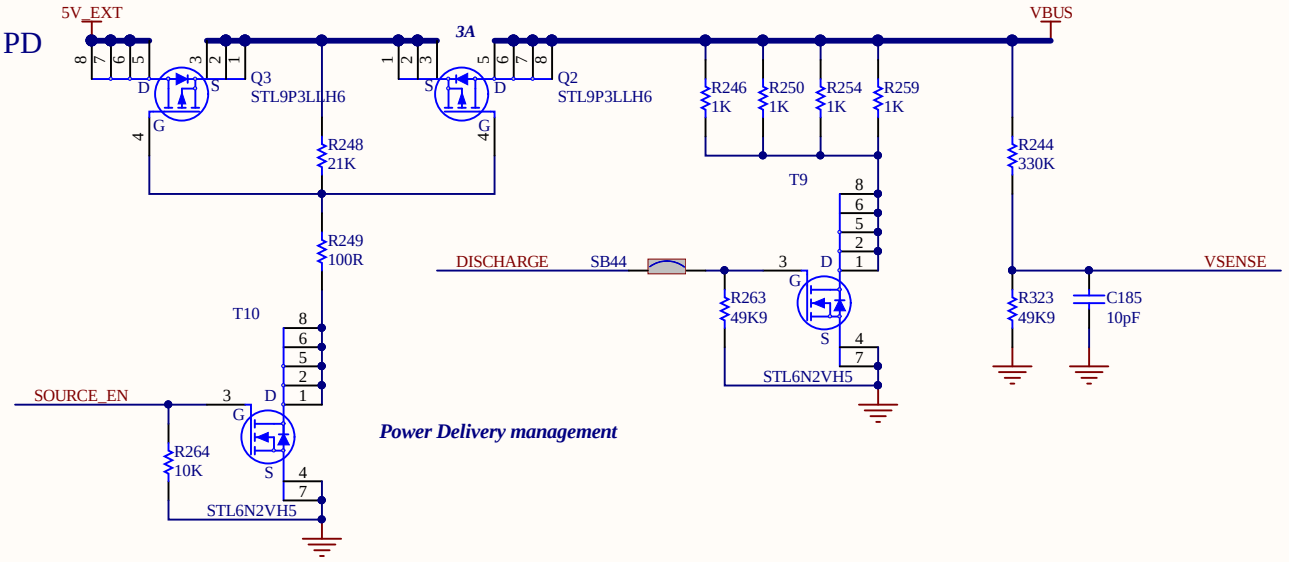

## MCU POWER



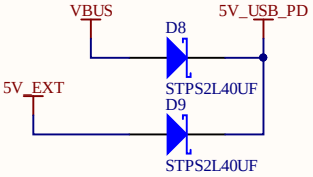

| | | |
|---|---|---|
| Title: **STM32_microcontroller_power** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 4 of 22 |

life.augmented

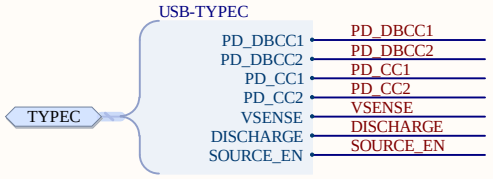
# USB PD



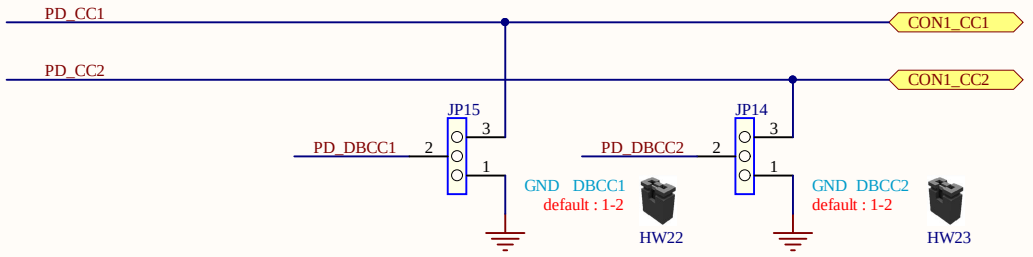

*Power Delivery management*




## USB-TYPEC

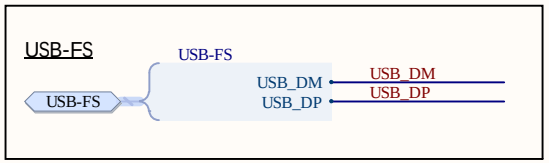


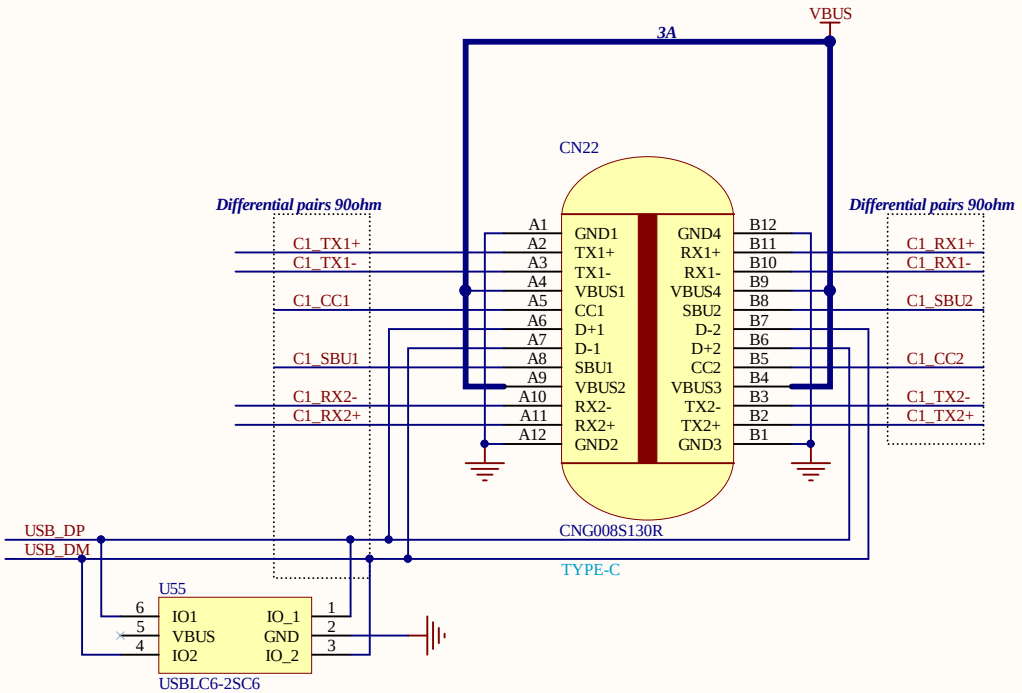

*TYPE-C Source port CC management*

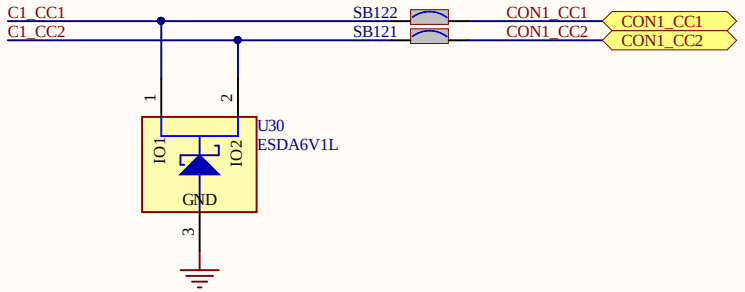


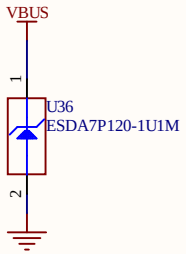

| | | |
|---|---|---|
| Title: **USB_PD** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 5 of 22 |

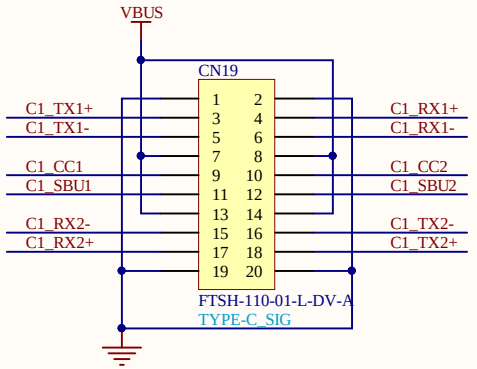
# USB-TYPEC CON



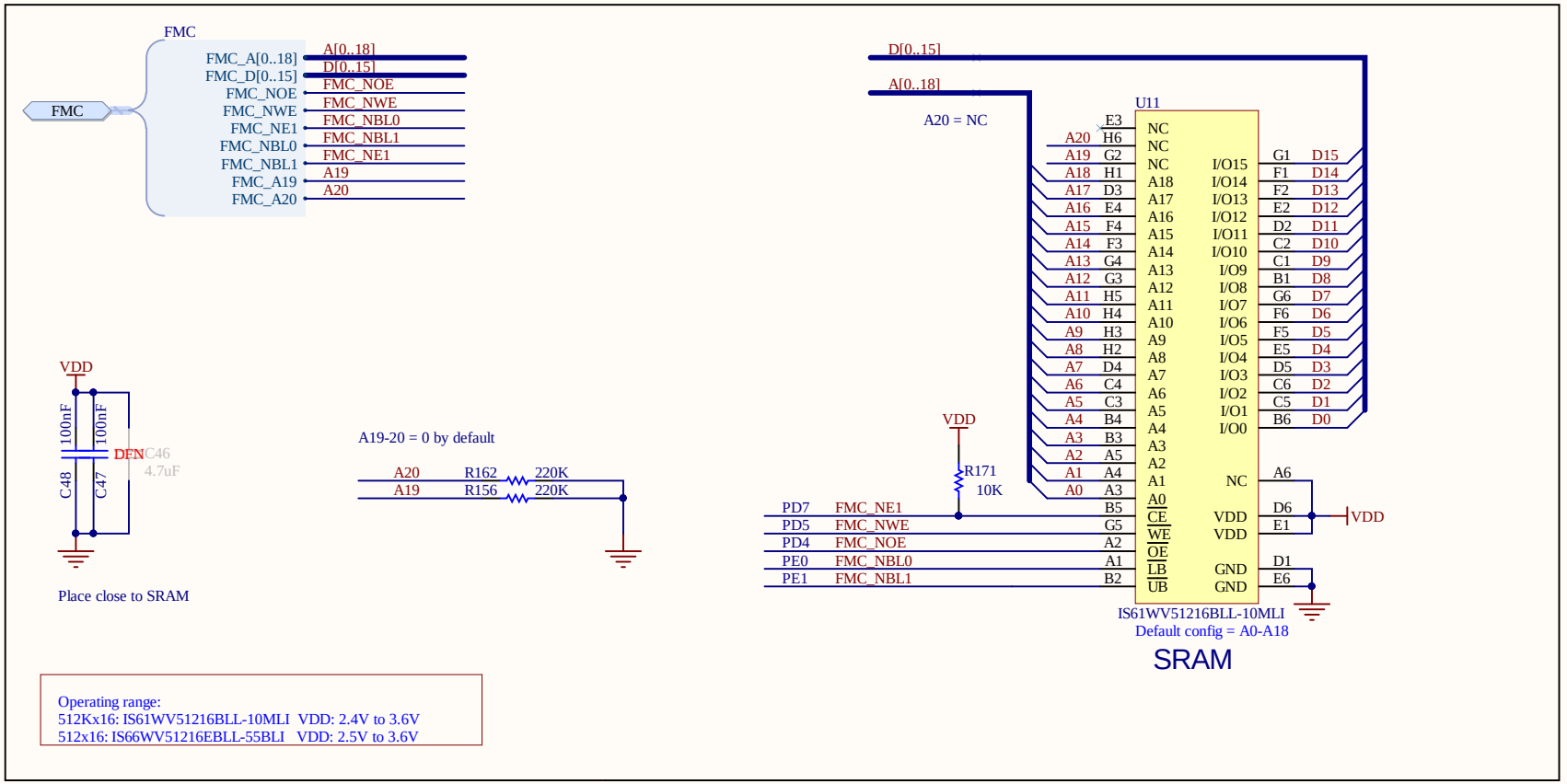




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| Title: **USB-TYPEC_CON** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | Reference: MB1397 | |
| Size: A4 | Date: 01-NOV-18 | Sheet: 6 of 22 |

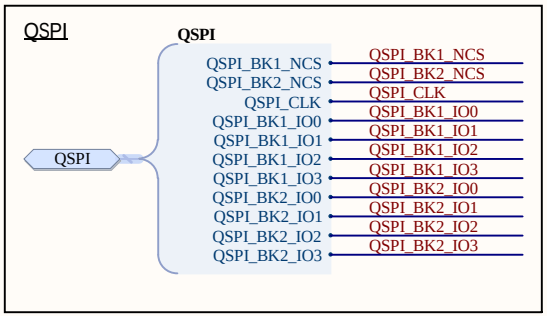
# MEMORY

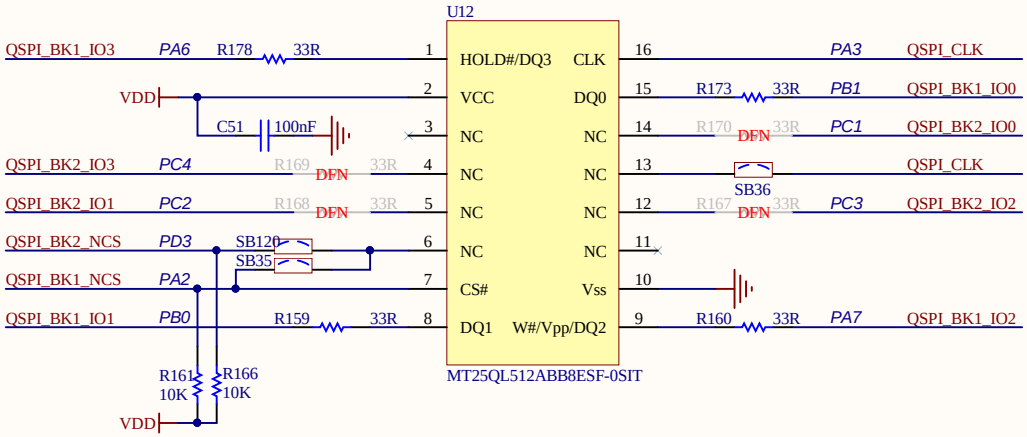


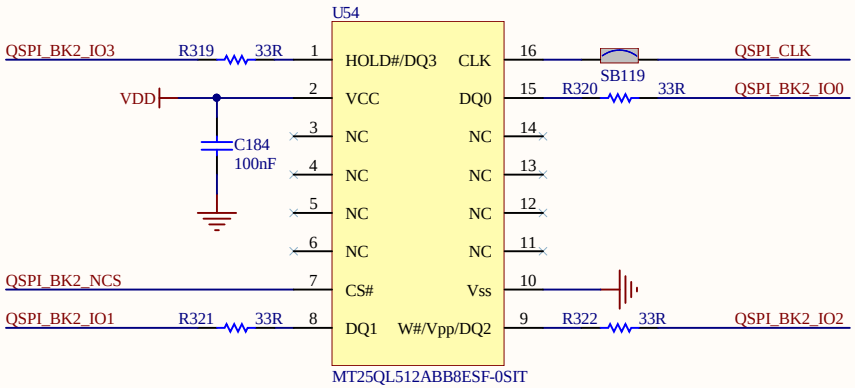

| | | |
|---|---|---|
| Title: **FMC Memory** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 7 of 22 |

life.augmented

# QSPI Memory




Operating range: 2.7V<VDD<3.6V

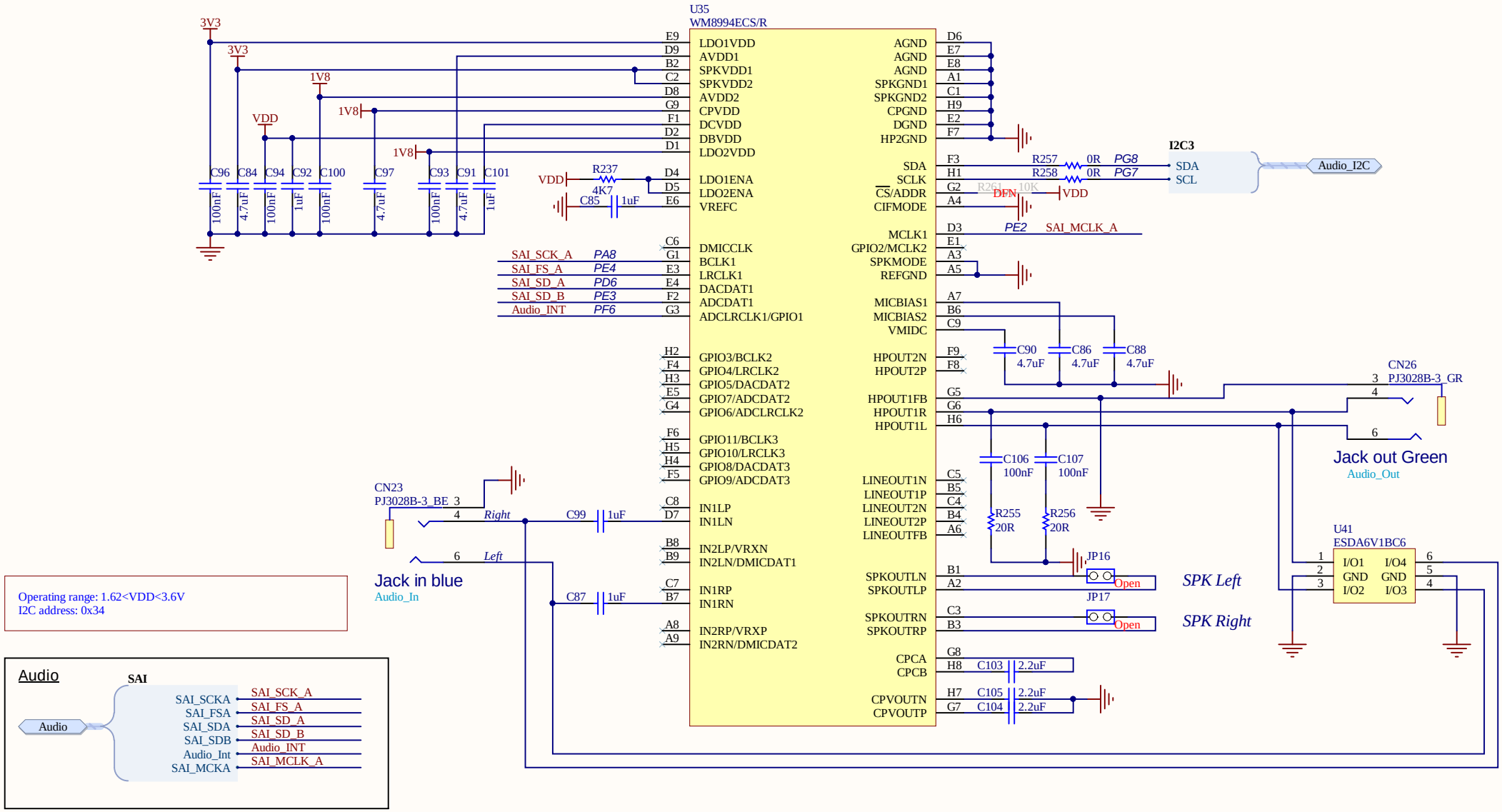
Twin Quad SPI Flash solutions:

| | | | | |
|---|---|---|---|---|
| One Twin Quad SPI Fllash | U12:MT25TL01GHBB8ESF-0SIT | U54:NA | R167/R168/R169/R170, SB120,SB36 ON | R319/R320/R321/R322, SB119, SB35, C184 OFF |
| Two Quad SPI Fllash (Default) | U12:MT25QL512ABB8ESF-0SIT | U54:MT25QL512ABB8ESF-0SIT | R319/R320/R321/R322, SB119, C184 ON | R167/R168/R169/R170, SB120, SB35, SB36 OFF |

| | | |
|---|---|---|
| Title: **QSPI Memory** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 8 of 22 |

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# Audio

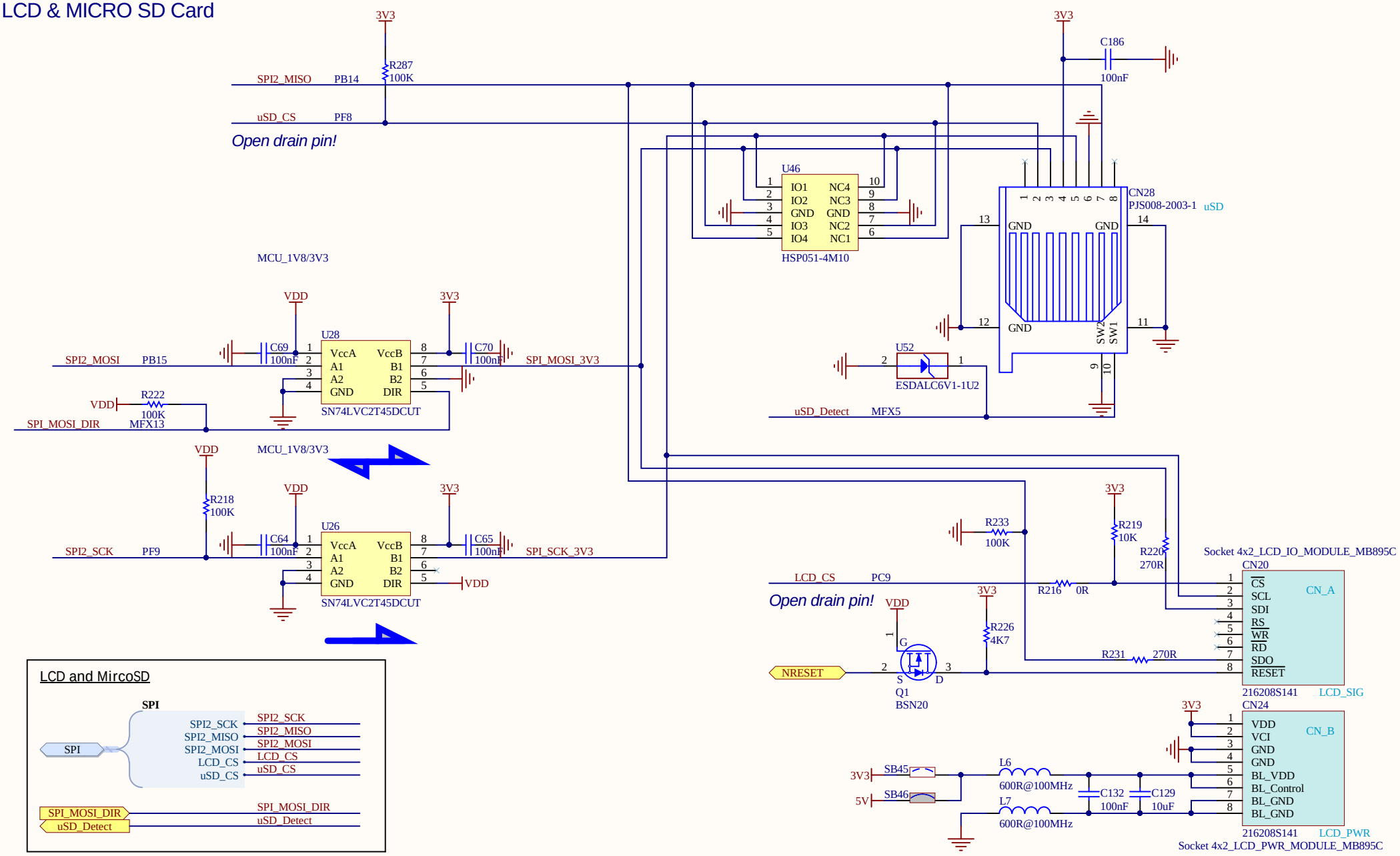



Operating range: 1.62<VDD<3.6V
I2C address: 0x34




| | | | |
|---|---|---|---|
| Title: **Audio** | | | |
| Project: **STM32G474E-EVAL** | | | |
| Variant: G474E | | | |
| Revision: B-04 | | Reference: MB1397 | |
| Size: A4 | Date: 01-NOV-18 | Sheet: 9 of 22 | |

# LCD & MICRO SD Card



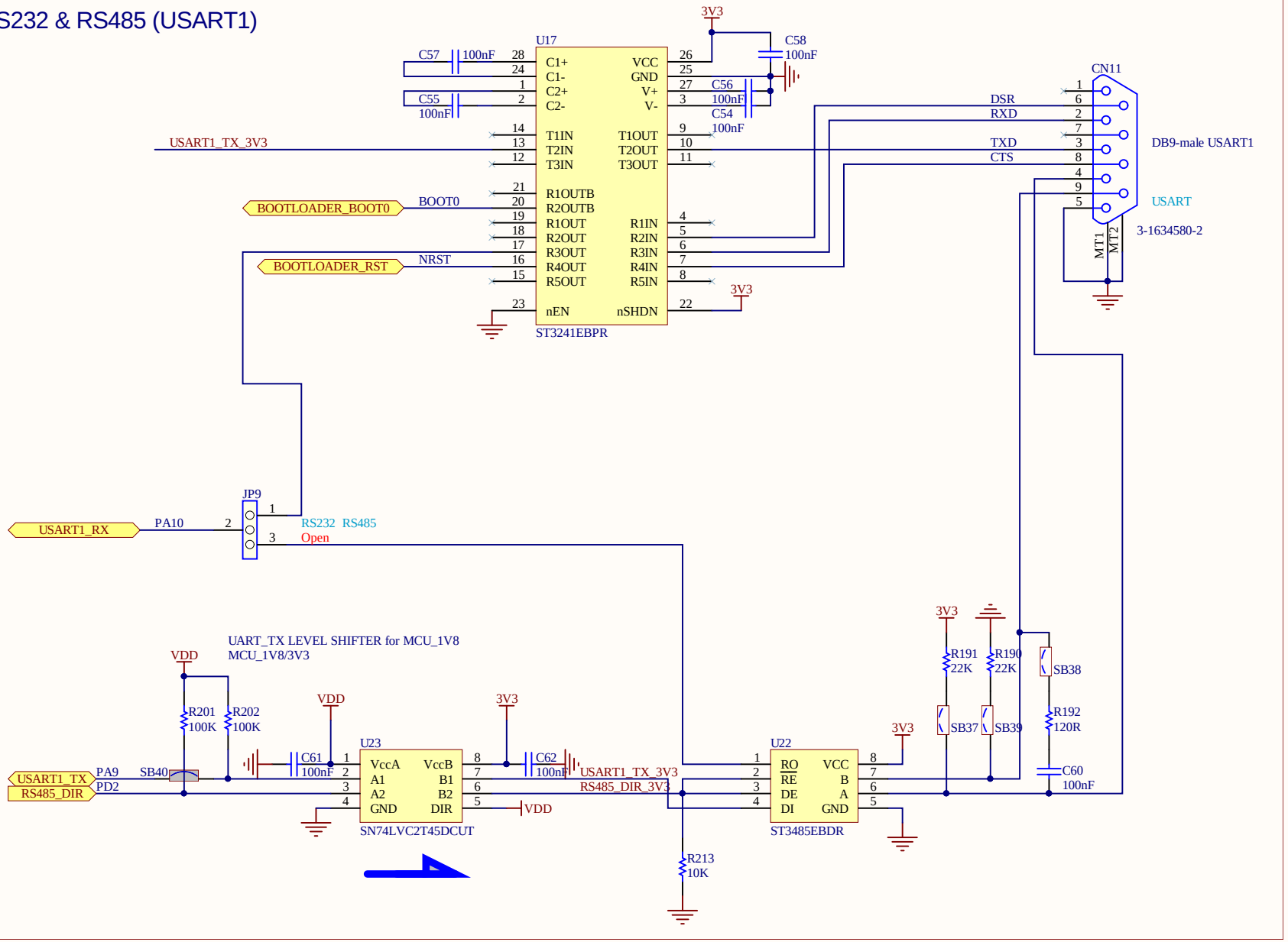

## LCD and MircoSD




| | | |
|---|---|---|
| Title: **LCD & SD Card** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 10 of 22 |

life.augmented

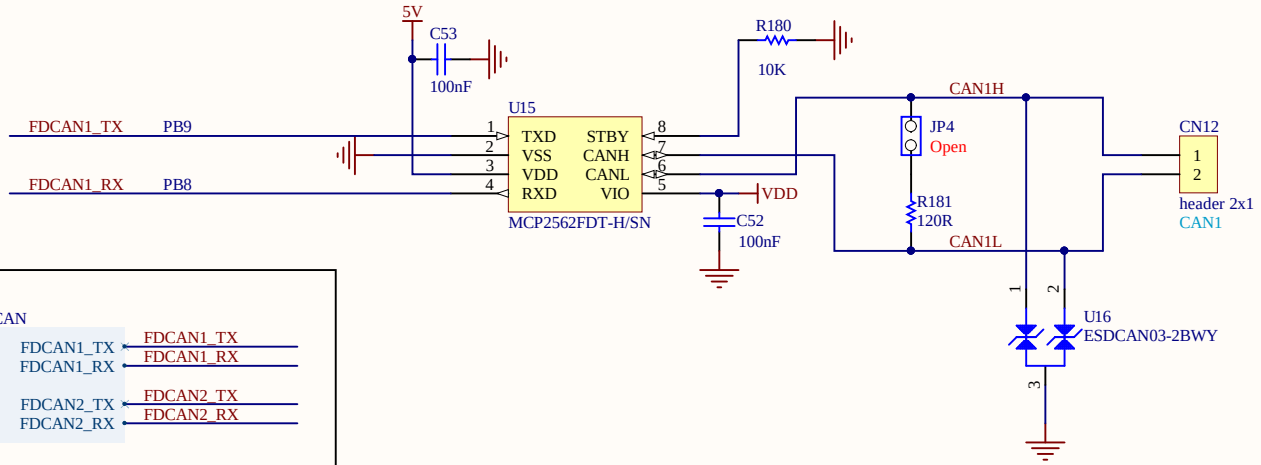
# RS232 & RS485 (USART1)

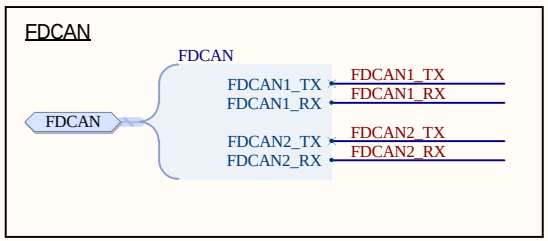


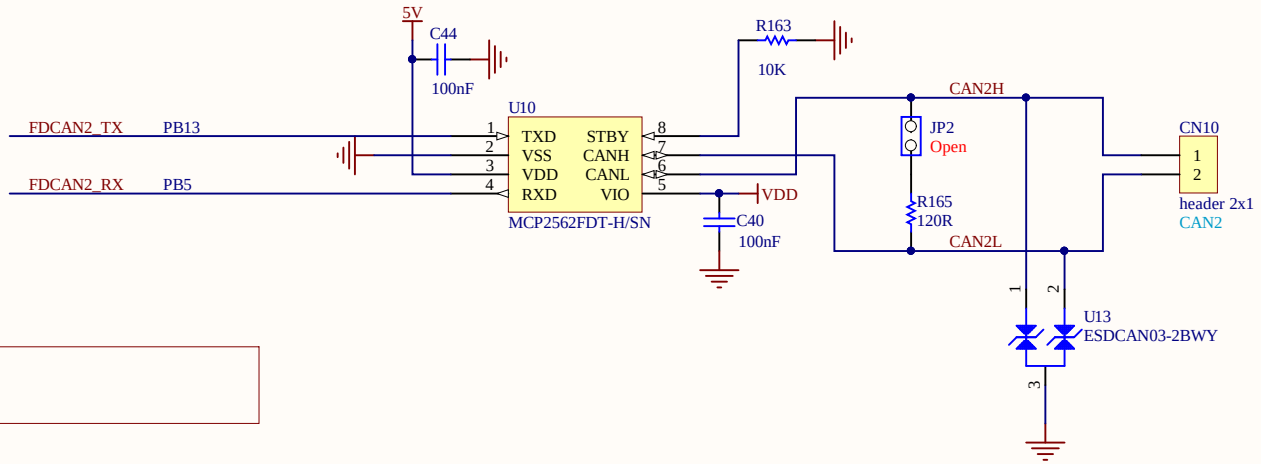

| | | | |
|---|---|---|---|
| Title: **RS232 & RS485** | | | |
| Project: **STM32G474E-EVAL** | | | |
| Variant: G474E | | | |
| Revision: B-04 | | Reference: MB1397 | |
| Size: A4 | Date: 01-NOV-18 | Sheet: 11 of 22 | |

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# 2x CAN FD



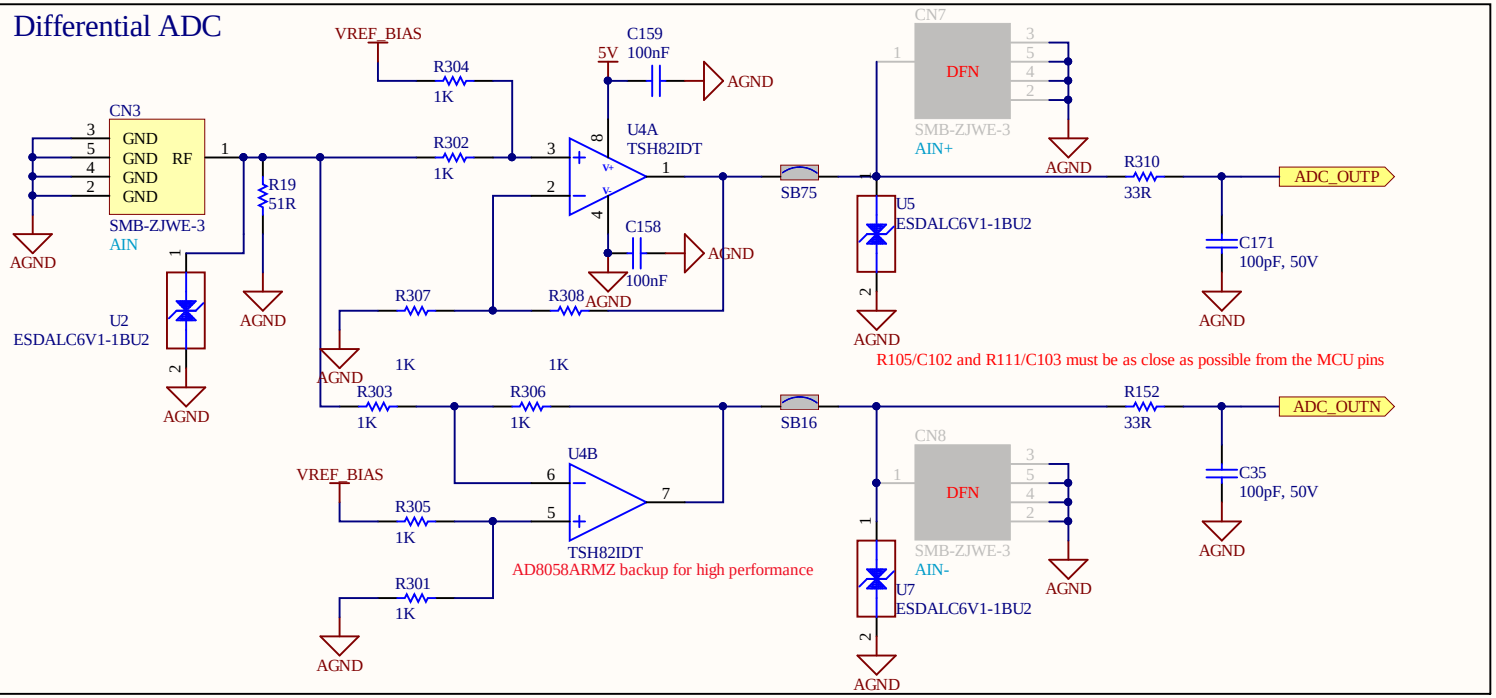




Operating range: VDD>1.8V

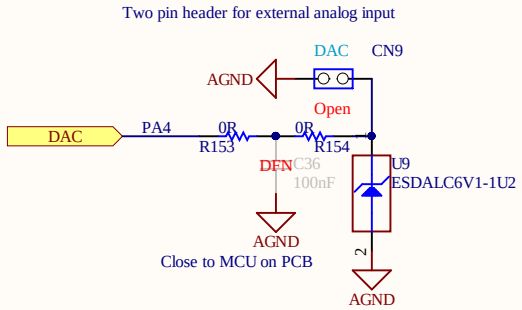
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|---|---|---|
| Title: **FDCAN** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
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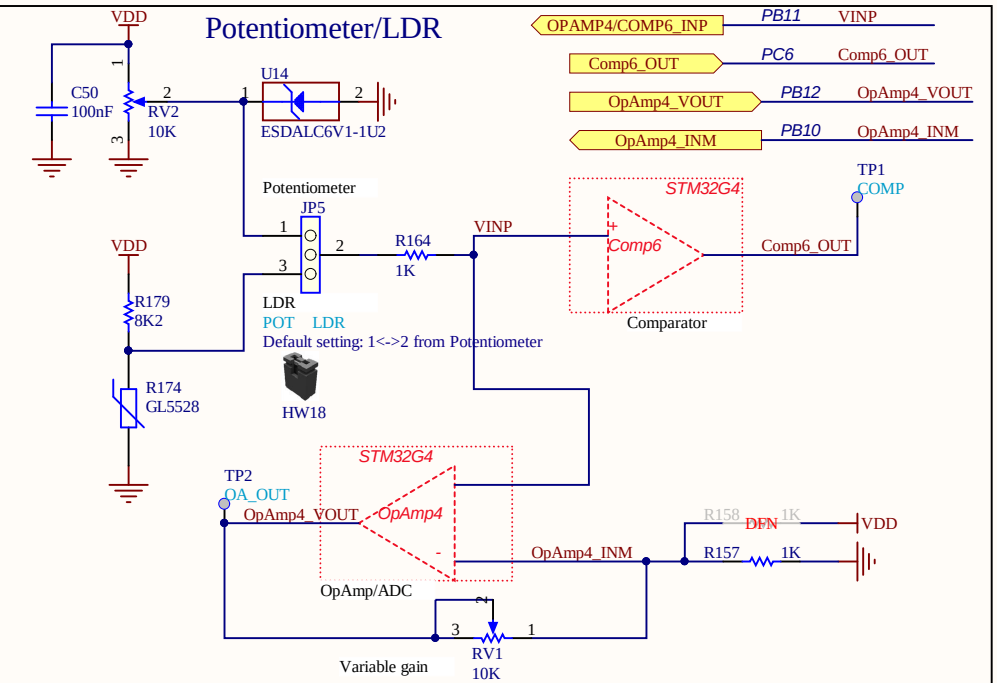
## Differential ADC

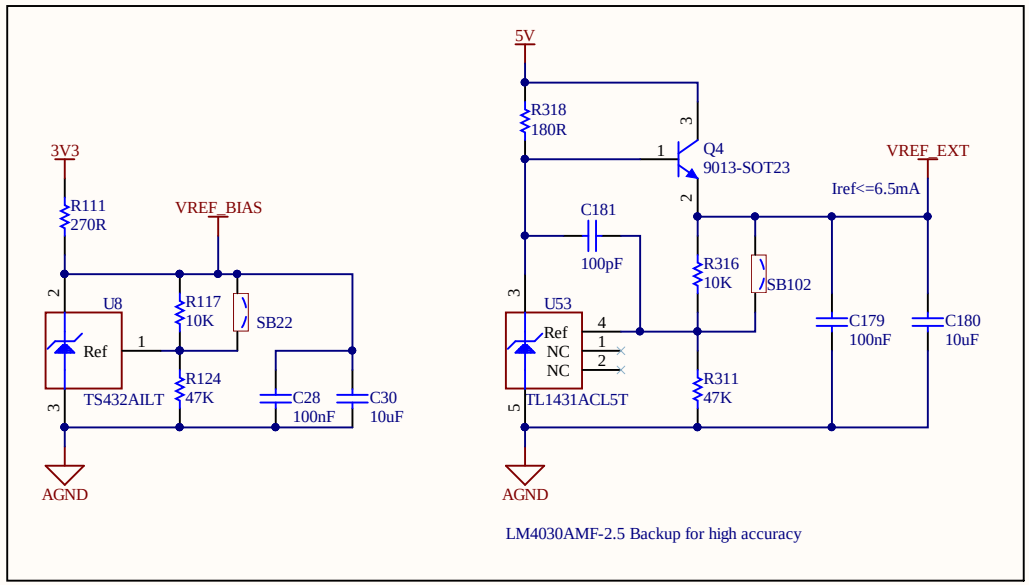



## DAC connector




## Potentiometer/LDR

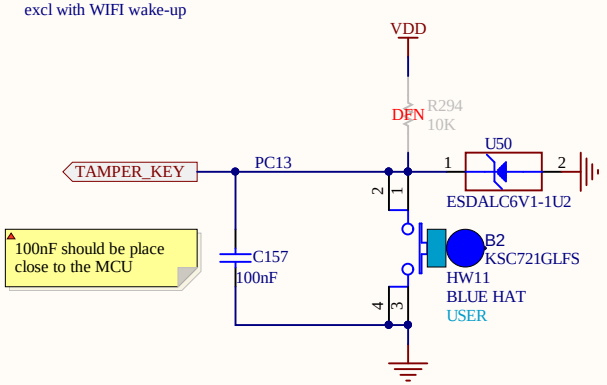


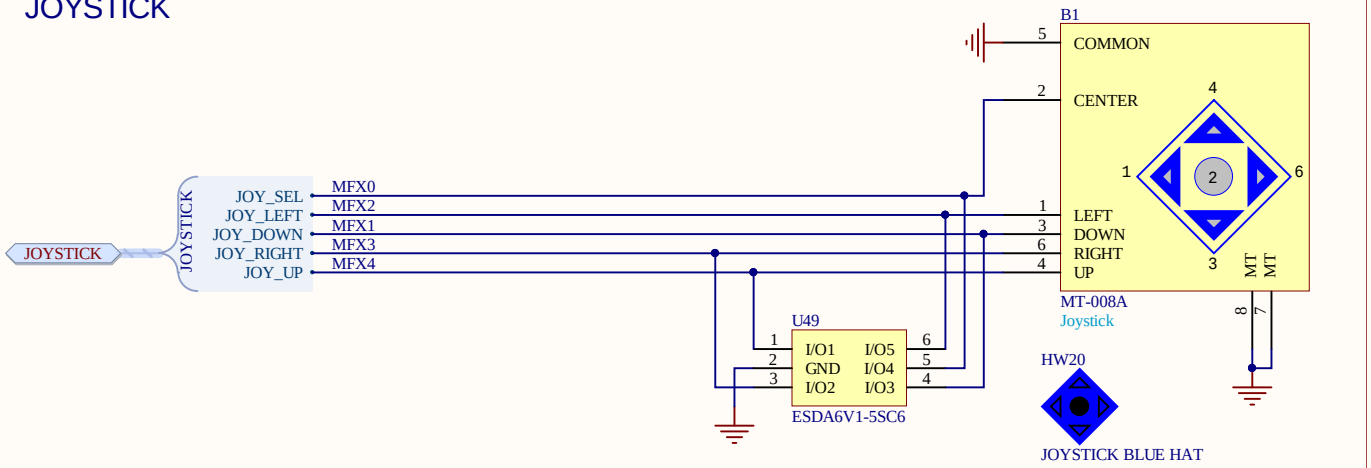

| | | |
|---|---|---|
| Title: **Analog Interfaces** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | Reference: MB1397 | |
| Size: A4 | Date: 01-NOV-18 | Sheet: 13 of 22 |

## TAMPER & KEY BUTTON

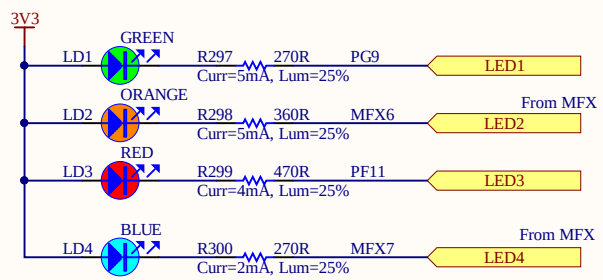
excl with WIFI wake-up



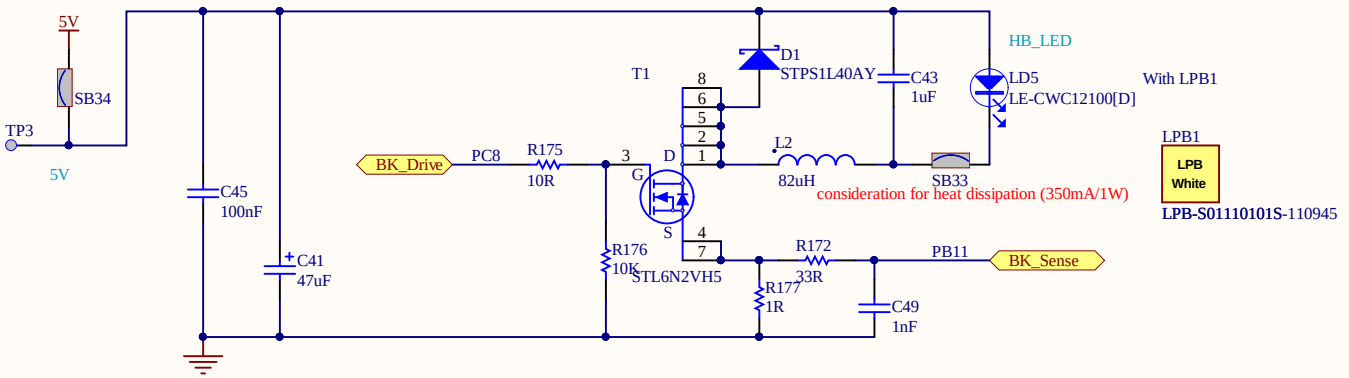

## JOYSTICK



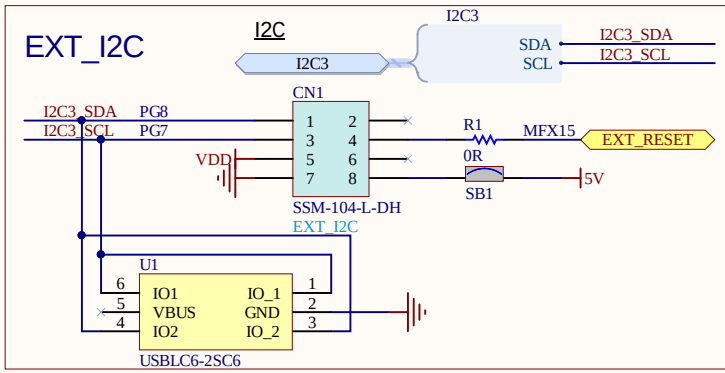

## LEDs



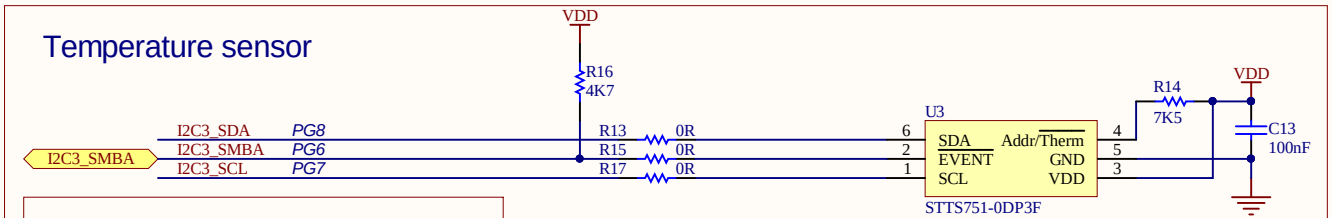

## LED BUCK converter




## EXT_I2C



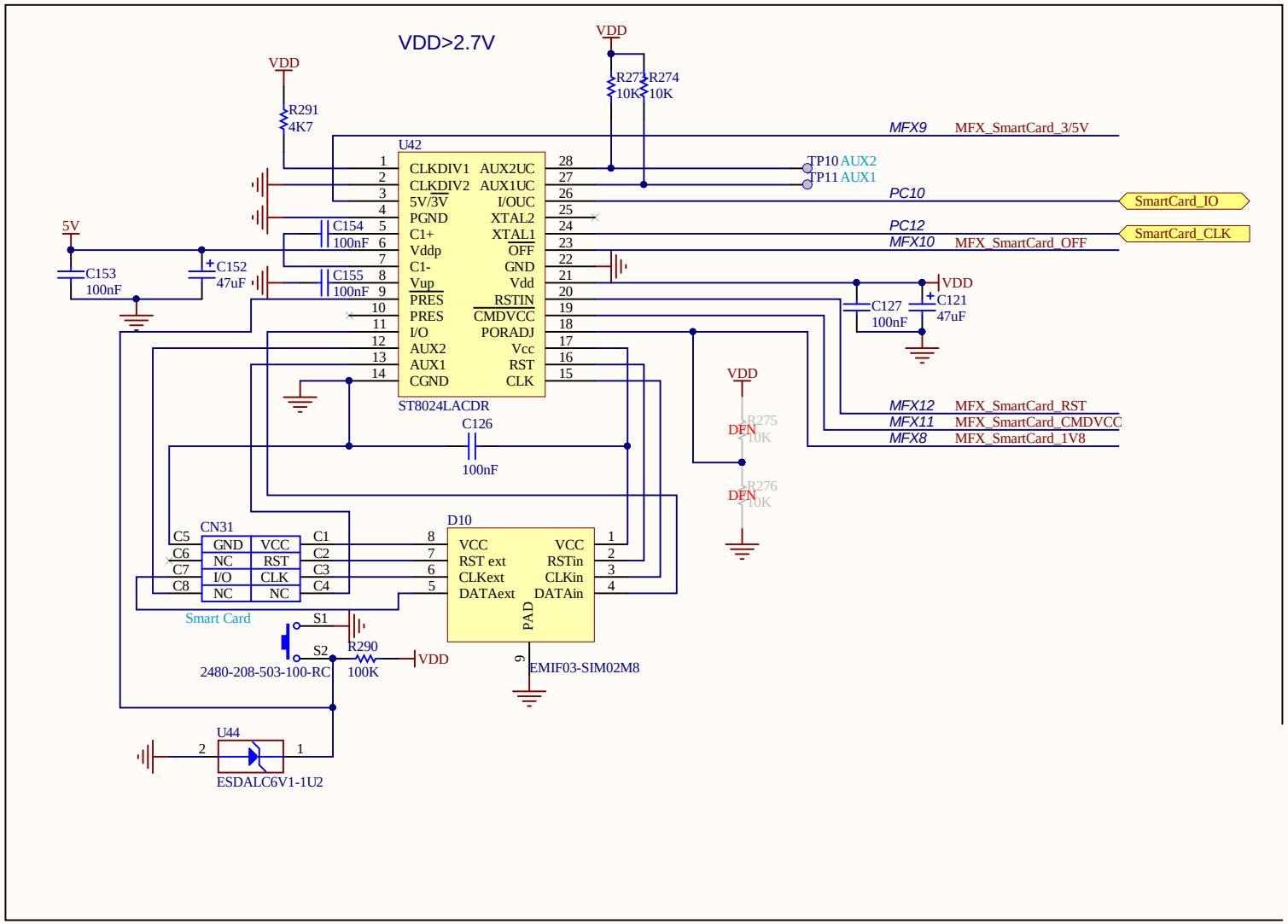

## Temperature sensor

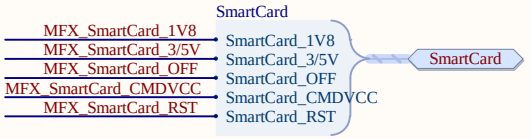



| | | |
|---|---|---|
| Title: **Peripherals** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 14 of 22 |

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# Smart Card




Operating range: VDD>2.7V

| | | |
|---|---|---|
| Title: **Smart Card** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 15 of 22 |

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## MOTOR

| MOTOR | | DUAL MOTOR |
|---|---|---|
| MC1_STOP | MC1_STOP | TIM1_BKIN |
| MC1_PWM_1H | MC1_PWM_1H | TIM1_CH1 |
| MC1_PWM_1L | MC1_PWM_1L | TIM1_CH1N |
| MC1_PWM_2H | MC1_PWM_2H | TIM1_CH2 |
| MC1_PWM_2L | MC1_PWM_2L | TIM1_CH2N |
| MC1_PWM_3H | MC1_PWM_3H | TIM1_CH3 |
| MC1_PWM_3L | MC1_PWM_3L | TIM1_CH3N |
| MC1_EnA | MC1_EnA | TIM2_CH1 |
| MC1_EnB | MC1_EnB | TIM2_CH2 |
| MC1_EnIndex | MC1_EnIndex | TIM2_CH3 |
| | | TIM2_ETR |
| MC1_MC2_PFCsync | MC1_MC2_PFCsync | TIM3_CH1 |
| MC1_MC2_PFCpwm | MC1_MC2_PFCpwm | TIM3_CH2 |
| MC1_MC2_PFC_SD | MC1_MC2_PFC_SD | TIM3_ETR |
| MC1_ICL_SHUTOUT | MC1_ICL_SHUTOUT | GPIO1 |
| MC1_DissipativeBrake | MC1_DissipativeBrake | GPIO2 |
| MC1_Temp | MC1_Temp | ADC2_IN5 |
| MC1_BusVoltage | MC1_BusVoltage | ADC12_IN7 |
| MC1_MC2_PFC_Ind | MC1_MC2_PFC_Ind | ADC4_IN12/5_IN12 |
| MC1_MC2_PFC_Vac | MC1_MC2_PFC_Vac | ADC4_IN13/5_IN13 |
| | | TIM8_BKIN |
| MC2_STOP | MC2_STOP | TIM8_CH1 |
| MC2_PWM_1H | MC2_PWM_1H | TIM8_CH1N |
| MC2_PWM_1L | MC2_PWM_1L | TIM8_CH2 |
| MC2_PWM_2H | MC2_PWM_2H | TIM8_CH2N |
| MC2_PWM_2L | MC2_PWM_2L | TIM8_CH3 |
| MC2_PWM_3H | MC2_PWM_3H | TIM8_CH3N |
| MC2_PWM_3L | MC2_PWM_3L | TIM5_CH1 |
| MC2_EnA | MC2_EnA | TIM5_CH2 |
| MC2_EnB | MC2_EnB | TIM5_CH3 |
| MC2_EnIndex | MC2_EnIndex | TIM5_ETR |
| | | GPIO3 |
| MC2_ICL_SHUTOUT | MC2_ICL_SHUTOUT | GPIO4 |
| MC2_DissipativeBrake | MC2_DissipativeBrake | ADC3_IN4 |
| MC2_Temp | MC2_Temp | ADC4_IN1 |
| MC2_BusVoltage | MC2_BusVoltage | |
| | | DAC1_OUT1 |
| MC_DAC_OUT1 | MC_DAC_OUT1 | DAC1_OUT2 |
| MC_DAC_OUT2 | MC_DAC_OUT2 | ADC12_IN8 |
| MC1_Ain | MC1_Ain | ADC12_IN9 |
| MC1_Bin | MC1_Bin | ADC12_IN6 |
| MC1_Cin | MC1_Cin | ADC345_IN7 |
| MC2_Ain | MC2_Ain | ADC345_IN9 |
| MC2_Bin | MC2_Bin | ADC345_IN10 |
| MC2_Cin | MC2_Cin | |
| | | OPAMP1_VINP |
| OPAMP1_INP | OPAMP1_INP | OPAMP1_VINM |
| OPAMP1_INN | OPAMP1_INN | OPAMP1_VOUT |
| OPAMP1_OUT | OPAMP1_OUT | OPAMP2_VINP |
| OPAMP2_IN1P | OPAMP2_IN1P | OPAMP2_VINM |
| OPAMP2_IN2P | OPAMP2_IN2P | OPAMP2_VOUT |
| OPAMP2_INN | OPAMP2_INN | OPAMP4_VINP |
| OPAMP2_OUT | OPAMP2_OUT | OPAMP4_VINM |
| OPAMP4_IN1P | OPAMP4_IN1P | OPAMP4_VOUT |
| OPAMP4_IN2P | OPAMP4_IN2P | OPAMP3_VINP |
| OPAMP4_INN | OPAMP4_INN | OPAMP3_VINM |
| OPAMP4_OUT | OPAMP4_OUT | OPAMP3_VOUT |
| OPAMP3_INP | OPAMP3_INP | |
| OPAMP3_INN | OPAMP3_INN | |
| OPAMP3_OUT | OPAMP3_OUT | |

## Dual Motor Control

3V3 — R9 3K3 — C1 1nF

MC1_STOP PE15

CN2 Motor control connector 1

| | | | |
|---|---|---|---|
| 1 | EMERGENCY STOP | GND | 2 |
| 3 | PWM_1H | GND | 4 |
| 5 | PWM_1L | GND | 6 |
| 7 | PWM_2H | GND | 8 |
| 9 | PWM_2L | GND | 10 |
| 11 | PWM_3H | GND | 12 |
| 13 | PWM_3L | BUS VOLTAGE | 14 |
| 15 | PHASE A CURRENT + | PHASE A CURRENT - | 16 |
| 17 | PHASE B CURRENT + | PHASE B CURRENT - | 18 |
| 19 | PHASE C CURRENT + | PHASE C CURRENT - | 20 |
| 21 | ICL shut out | GND | 22 |
| 23 | DISSIPATIVE BRAKE | PFC Inductor current | 24 |
| 25 | +5V POWER | Heatsink Temperature | 26 |
| 27 | PFC SYNC | 3.3V Power | 28 |
| 29 | PFC PWM | PFC Shut down | 30 |
| 31 | Encoder A | PFC Vac | 32 |
| 33 | Encoder B | Encoder Index | 34 |

Header 17x2 IDC34 MotorControl
MC1

MC1_PWM_1H PE9 — MC1_PWM_1L PE8 — MC1_PWM_2H PE11 — MC1_PWM_2L PE10 — MC1_PWM_3H PE13 — MC1_PWM_3L PE12

MC1_CurrentA+ R2 0R — MC1_CurrentB+ R4 0R — MC1_CurrentC+ R6 0R — C8 C6 C2 DFN 100nF

MC1_ICL_SHUTOUT PE4 — MC1_DissipativeBrake PE5

MC1_MC2_PFCsync PE2 R8 0R — MC1_MC2_PFCpwm PE3 R11 0R — MC1_EnA PA0 — MC1_EnB PD4

5V — SB2 DFN — C3 C9 DFN 100nF — C12 10nF

R3 0R — C4 100nF — PC1 MC1_BusVoltage

R5 0R — R7 0R — PD8 MC1_MC2_PFC_Ind — PC4 MC1_Temp

3V3 — R10 0R — R12 0R — PD2 MC1_MC2_PFC_SD — PD9 MC1_MC2_PFC_Vac

PD7/PA15 MC1_EnIndex — C11 DFN 100nF — C7 100nF C5 100nF C10 DFN 100nF

3V3 — R23 3K3 — C16 1nF

MC2_STOP PB7 R21 0R

CN4 Motor control connector 2

| | | | |
|---|---|---|---|
| 1 | EMERGENCY STOP | GND | 2 |
| 3 | PWM_1H | GND | 4 |
| 5 | PWM_1L | GND | 6 |
| 7 | PWM_2H | GND | 8 |
| 9 | PWM_2L | GND | 10 |
| 11 | PWM_3H | GND | 12 |
| 13 | PWM_3L | BUS VOLTAGE | 14 |
| 15 | PHASE A CURRENT + | PHASE A CURRENT - | 16 |
| 17 | PHASE B CURRENT + | PHASE B CURRENT - | 18 |
| 19 | PHASE C CURRENT + | PHASE C CURRENT - | 20 |
| 21 | ICL shut out | GND | 22 |
| 23 | DISSIPATIVE BRAKE | PFC Inductor current | 24 |
| 25 | +5V POWER | Heatsink Temperature | 26 |
| 27 | PFC SYNC | 3.3V Power | 28 |
| 29 | PFC PWM | PFC Shut down | 30 |
| 31 | Encoder A | PFC Vac | 32 |
| 33 | Encoder B | Encoder Index | 34 |

Header 17x2 IDC34 MotorControl
MC2

MC2_PWM_1H PC6 — MC2_PWM_1L PC10 — MC2_PWM_2H PC7 — MC2_PWM_2L PC11 — MC2_PWM_3H PC8 — MC2_PWM_3L PC12

MC2_CurrentA+ R86 0R — MC2_CurrentB+ R92 0R — MC2_CurrentC+ R100 0R — C23 C24 C26 DFN 100nF

MC2_ICL_SHUTOUT PD15 — MC2_DissipativeBrake PF10

MC1_MC2_PFCsync R126 DFN 0R — MC1_MC2_PFCpwm R151 DFN 0R — MC2_EnA PF6 — MC2_EnB PF7

5V — SB32 DFN — C37 C42 DFN 100nF — C38 10nF

R18 0R — R77 0R — C22 100nF — PE14 MC2_BusVoltage

R113 DFN 0R — R120 DFN 0R — PE7 MC2_Temp

R128 DFN 0R — R155 DFN 0R — MC1_MC2_PFC_SD — MC1_MC2_PFC_Vac

3V3 — PF8/PD11 MC2_EnIndex — C39 DFN 100nF — C29 DFN 100nF C31 DFN 100nF C34 DFN 100nF

## 3-phase voltage

SW5 SS42D02 SWITCH_SS42D02

MC1_CurrentA+ — PC2 — R64 0R — MC1_Ain

MC1_CurrentB+ — PC3 — R55 0R — MC1_Bin

MC1_CurrentC+ — PC0 — R52 0R — MC1_Cin

R72 0R — R76 1K3 — SB14 — R58 0R — R59 1K3

SW1 MS-22D16 SWITCH_MS-22D16

R66 9K1 — C21 120pF — R51 9K1 — C18 120pF — R25 9K1 — C15 120pF — R24 1K3 — R22 1K3

R20 9K1 — C14 120pF — R95 9K1 — C25 120pF — R122 9K1 — C32 120pF

R110 0R — R104 1K3 — SB19 — R114 0R — R115 1K3

SW6 SS42D02 SWITCH_SS42D02

MC2_CurrentC+ — PD13 — R119 0R — MC2_Cin

MC2_CurrentB+ — PD12 — R99 0R — MC2_Bin

MC2_CurrentA+ — PD10 — R103 0R — MC2_Ain

R61 0R — PA1 OPAMP1_INP — R65 1K1 DFN — PA3 OPAMP1_INN — C20 R67 3K3 DFN DEN 120pF — PA2 OPAMP1_OUT — OpAmp1 — To ADC

R31 0R — PA7 OPAMP2_IN1P — PD14 OPAMP2_IN2P — R56 1K1 DFN — PC5 OPAMP2_INN — C19 R57 3K3 DFN DEN 120pF — PA6 OPAMP2_OUT — OpAmp2 — To ADC

PB11 OPAMP4_IN1P — R91 0R — PB13 OPAMP4_IN2P — R33 1K1 DFN — PB10 OPAMP4_INN — C17 R33 3K3 DFN DEN 120pF — PB12 OPAMP4_OUT — OpAmp4 — To ADC

R125 0R — PB0 OPAMP3_INP — R107 1K1 DFN — PB2 OPAMP3_INN — C27 R105 3K3 DFN DEN 120pF — PB1 OPAMP3_OUT — OpAmp3 — To ADC

SW3 SS42D02 SWITCH_SS42D02

SW2 SS42D02 SWITCH_SS42D02

3V3 — Default to 3V3

SW4 MS-22D16 SWITCH_MS-22D16

PA4 MC_DAC_OUT1

HW27

CN32 — PA5 MC_DAC_OUT2

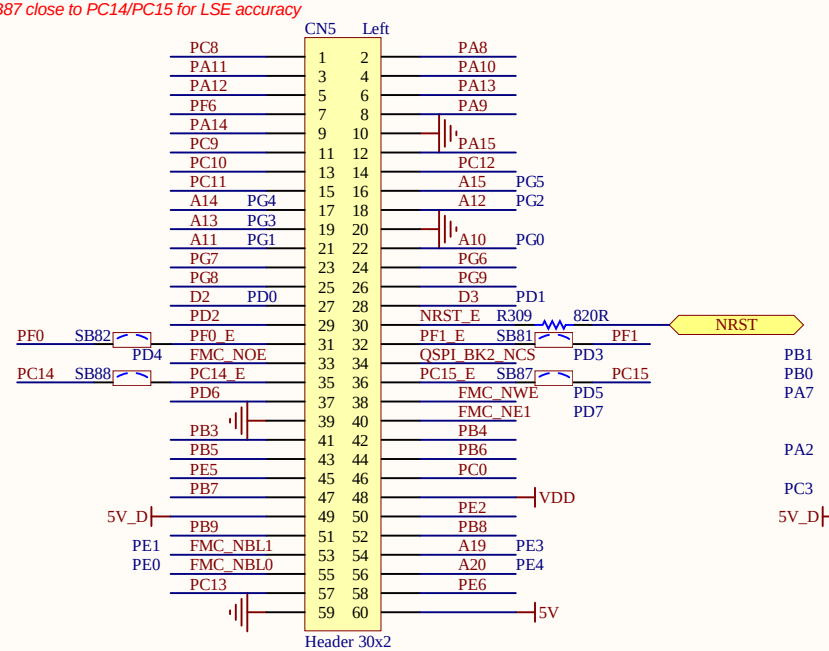
DAC2 Closed

| | | | |
|---|---|---|---|
| Title: **Motor Control** | | | |
| Project: **STM32G474E-EVAL** | | | |
| Variant: G474E | | | |
| Revision: B-04 | | Reference: MB1397 | |
| Size: A3 | Date: 01-NOV-18 | Sheet: 16 of 22 | |

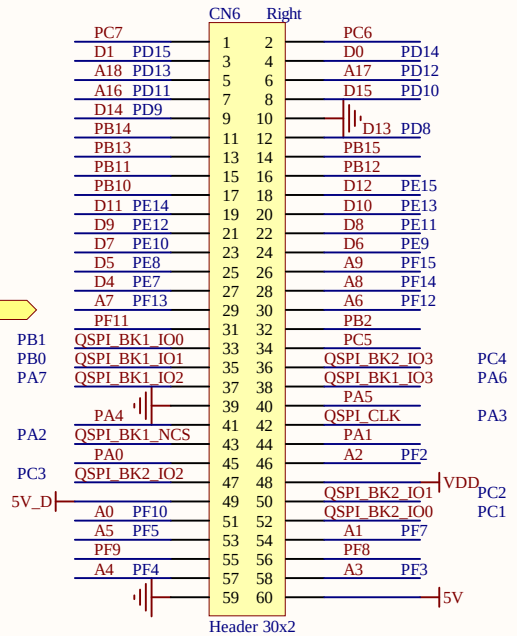
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# MCU EXTENSION CONNECTORS

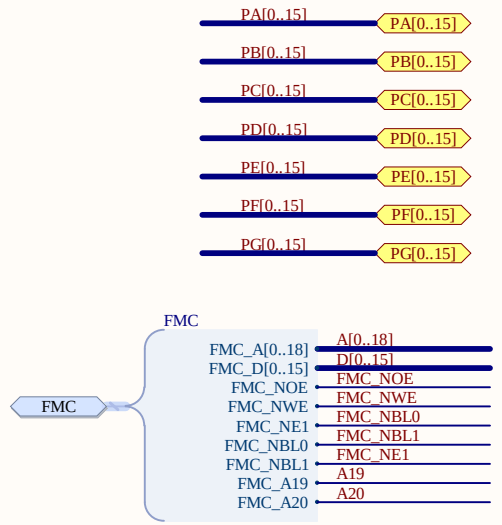
*SB82 and SB81 close to PF0/PF1 for HSE accuracy*
*SB88 and SB87 close to PC14/PC15 for LSE accuracy*

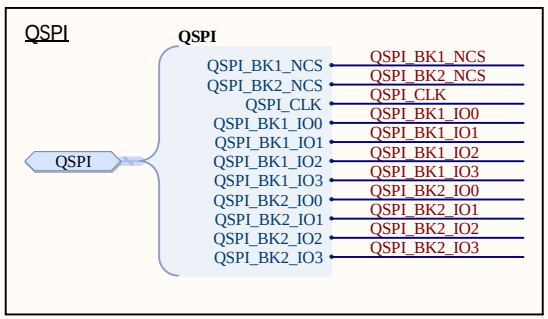



FTR-130-03-L-D-LC (Samtec)
or FTR-130-53-L-D-LC (Samtec) ?




TSW-130-07-G-DSamtec)
or FTR-130-53-L-D-LC (Samtec) ?

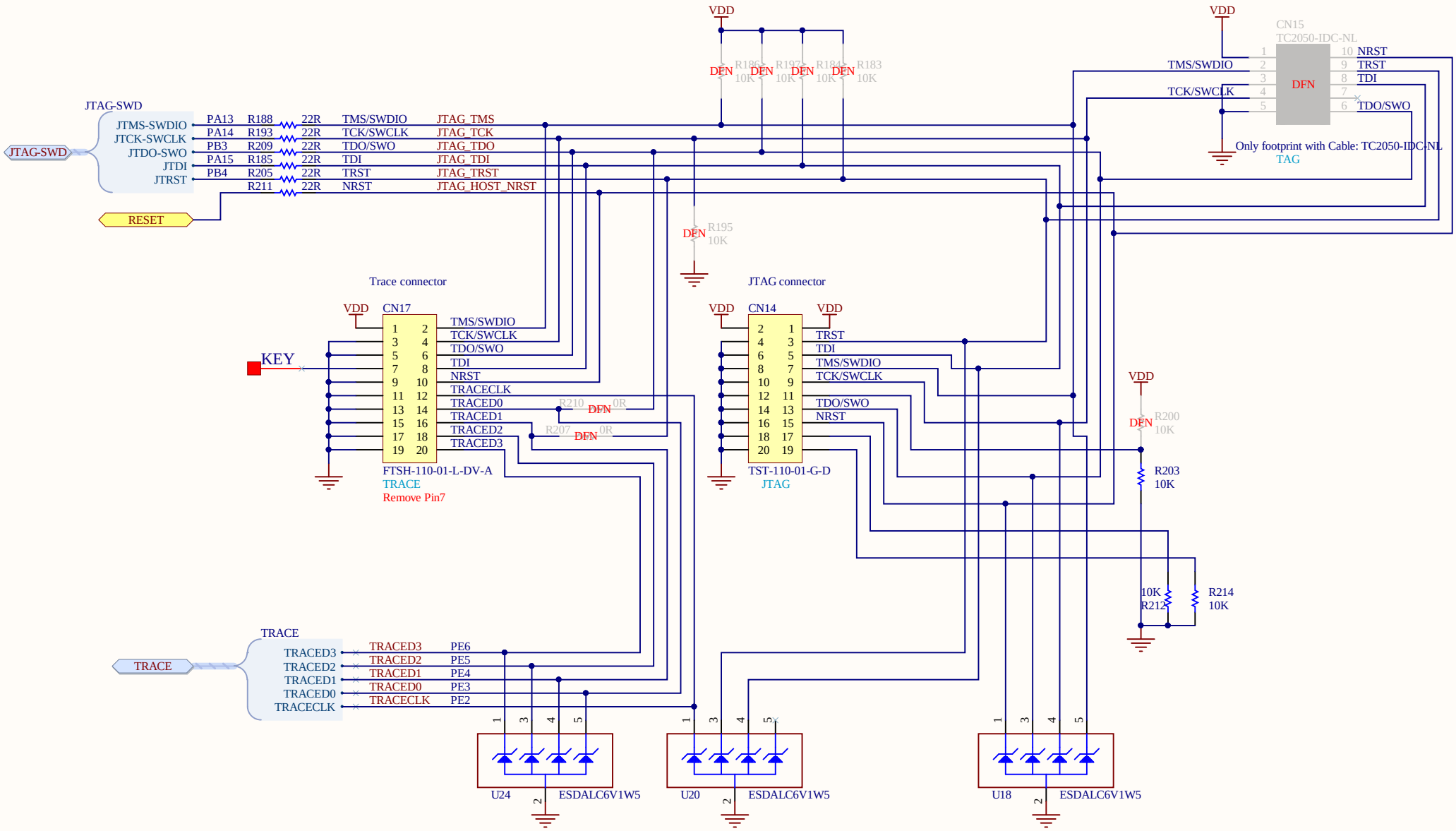



| | | | |
|---|---|---|---|
| Title: **Extension Connectors** | | | |
| Project: **STM32G474E-EVAL** | | | |
| Variant: G474E | | | |
| Revision: B-04 | | Reference: MB1397 | |
| Size: A4 | Date: 01-NOV-18 | Sheet: 17 of 22 | |

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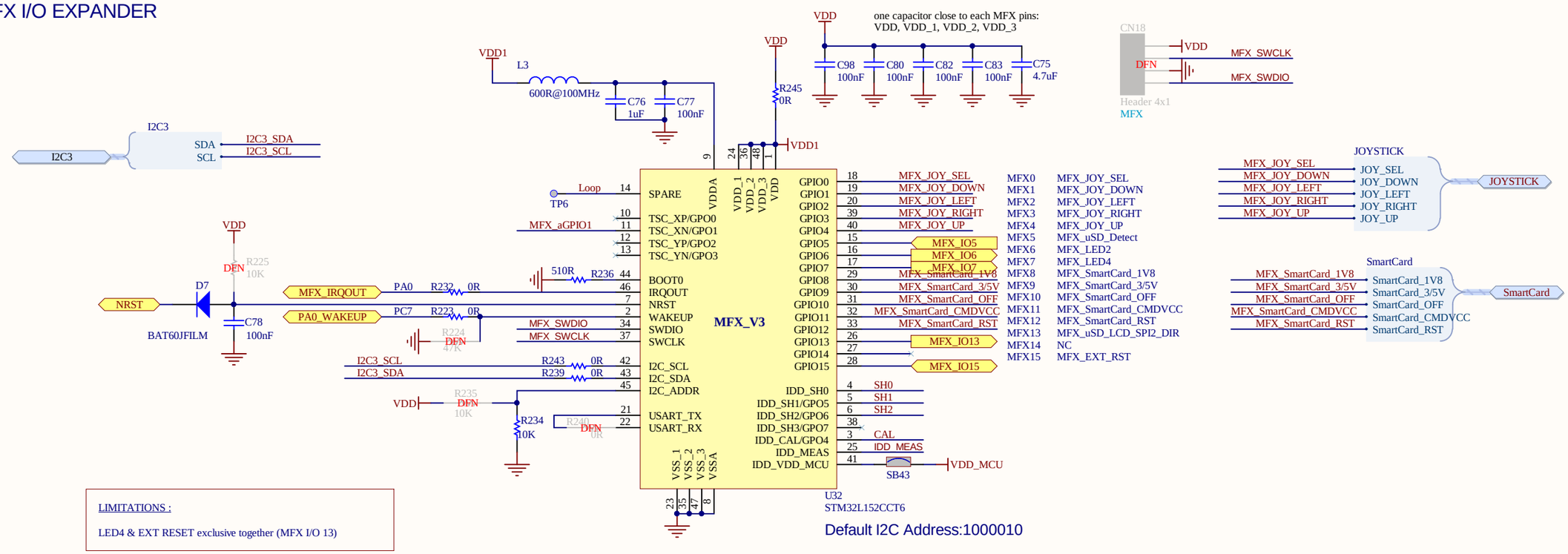
# JTAG & TRACE



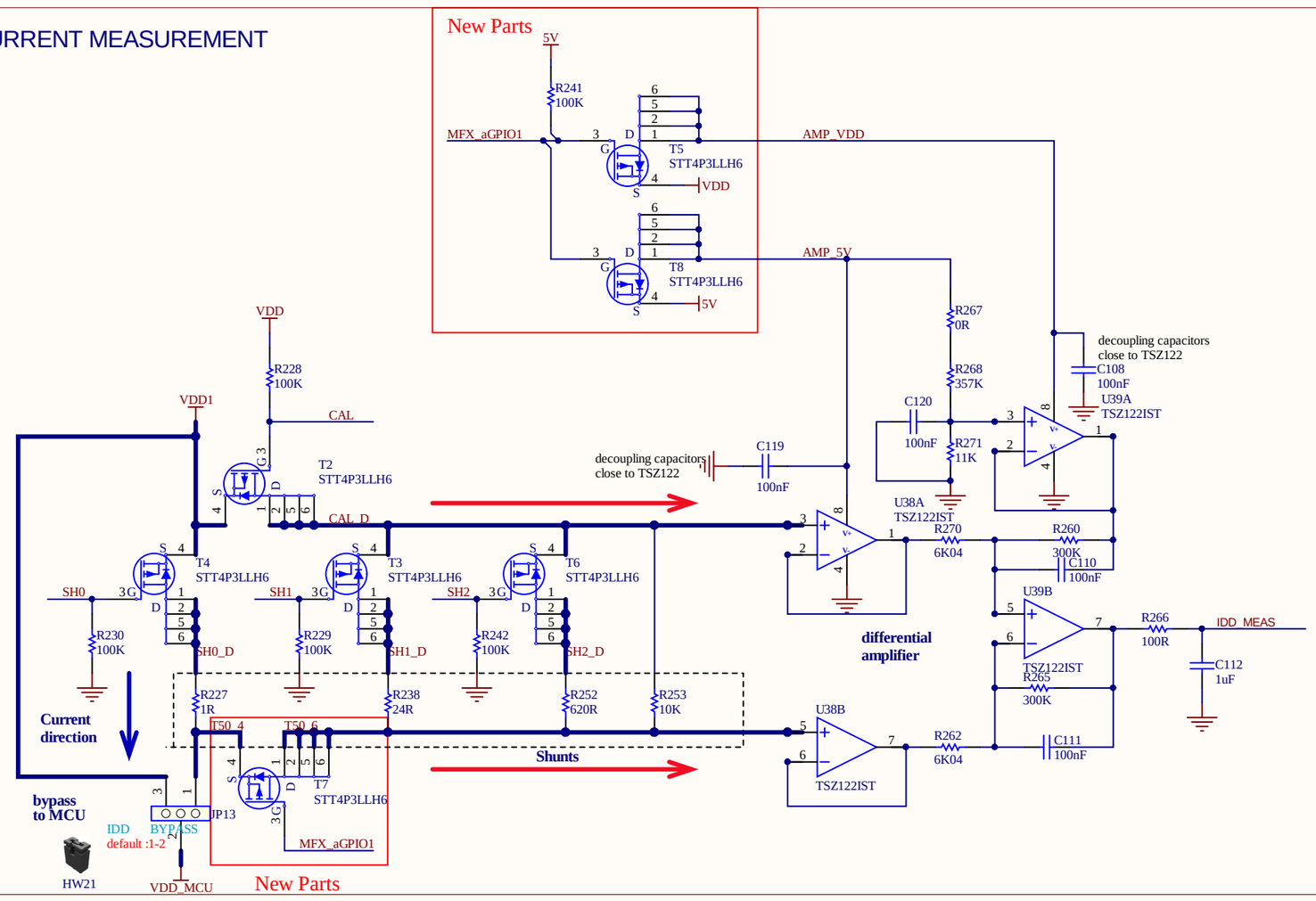

| | | |
|---|---|---|
| Title: **Debug connector** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | Reference: MB1397 | |
| Size: A4 | Date: 01-NOV-18 | Sheet: 18 of 22 |

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# MFX I/O EXPANDER




# MFX CURRENT MEASUREMENT

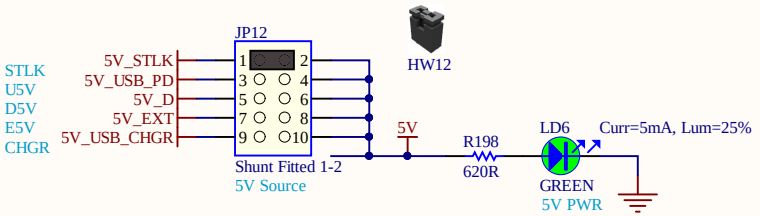



| | | | |
|---|---|---|---|
| Title: **Multi-Function Expander** | | | |
| Project: **STM32G474E-EVAL** | | | |
| Variant: G474E | | | |
| Revision: B-04 | | Reference: MB1397 | |
| Size: A3 | Date: 01-NOV-18 | Sheet: 19 of 22 | |

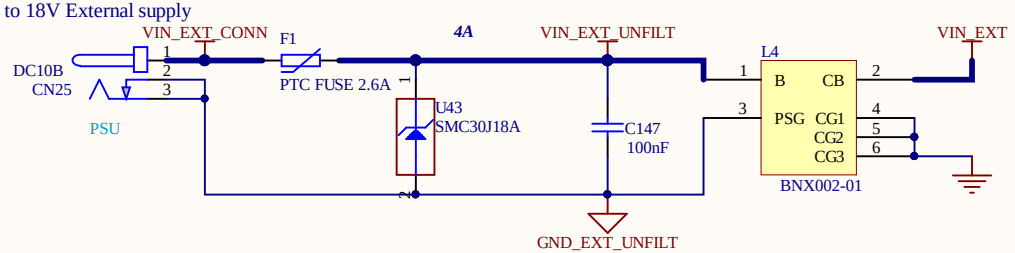
life.augmented

# BOARD POWER

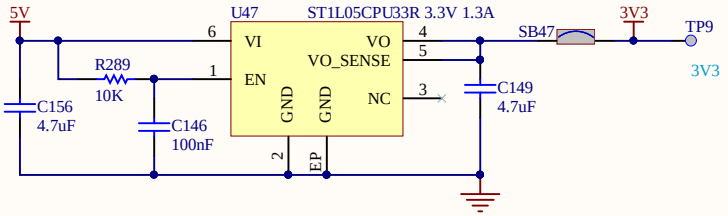
## 5V Power Supply options



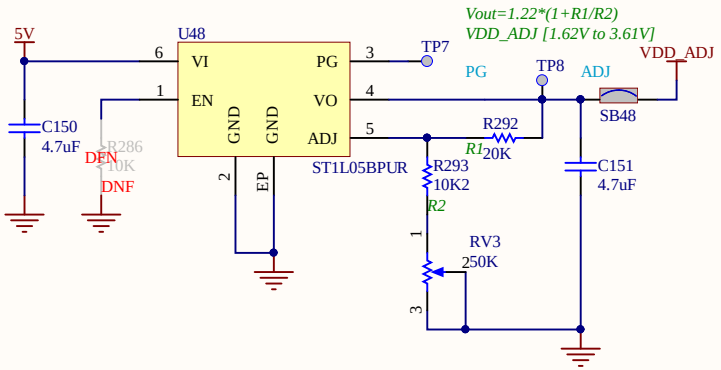

## 5V to 18V External supply

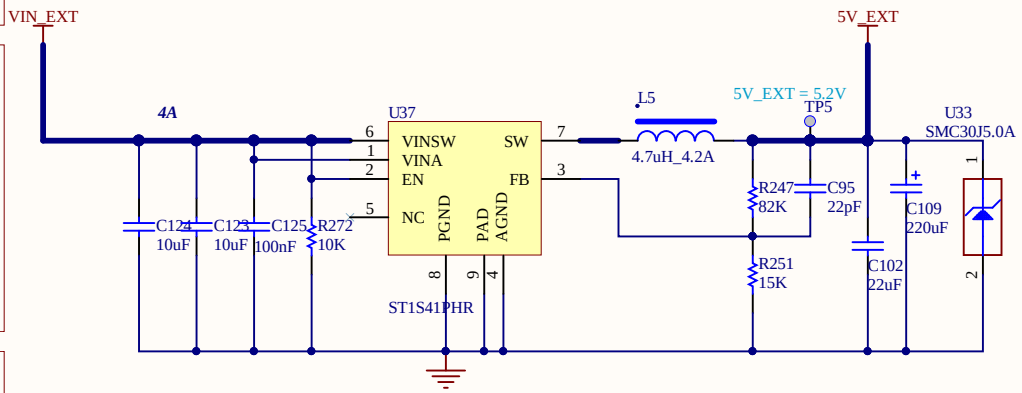



## 3V3 Supply

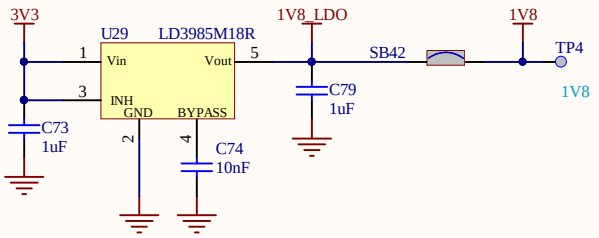



## VDD ADJ Supply




## 1V8

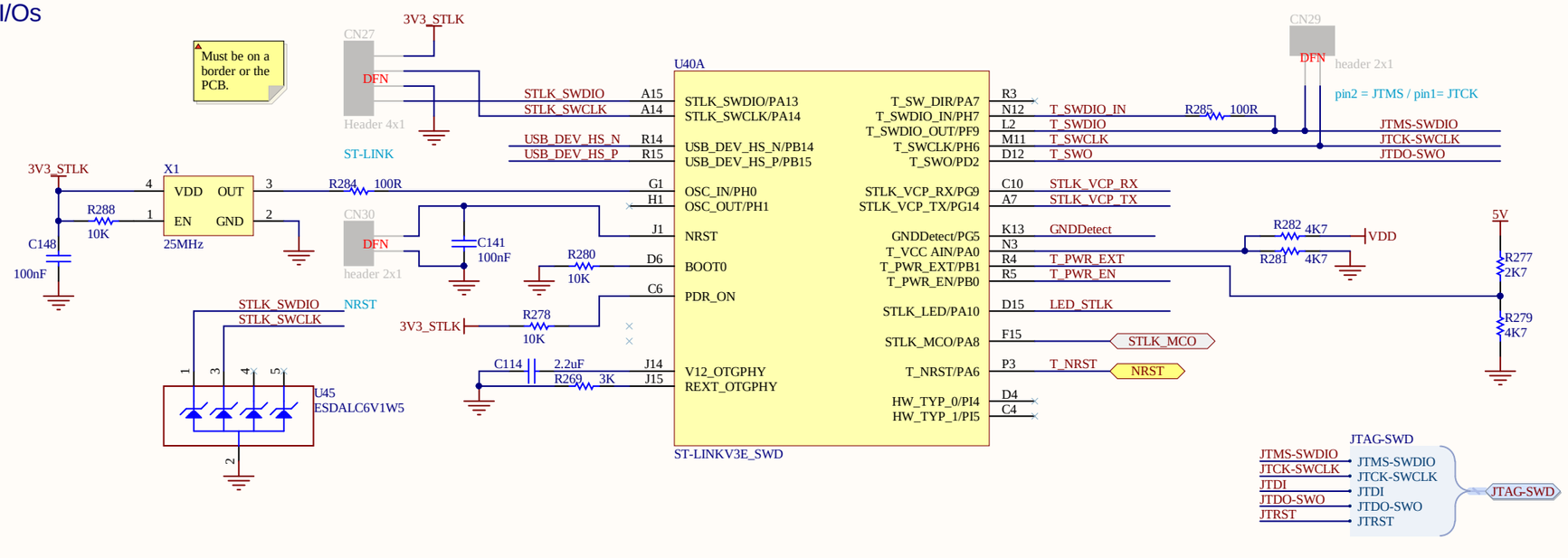



| | | |
|---|---|---|
| Title: **Board Power** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 20 of 22 |

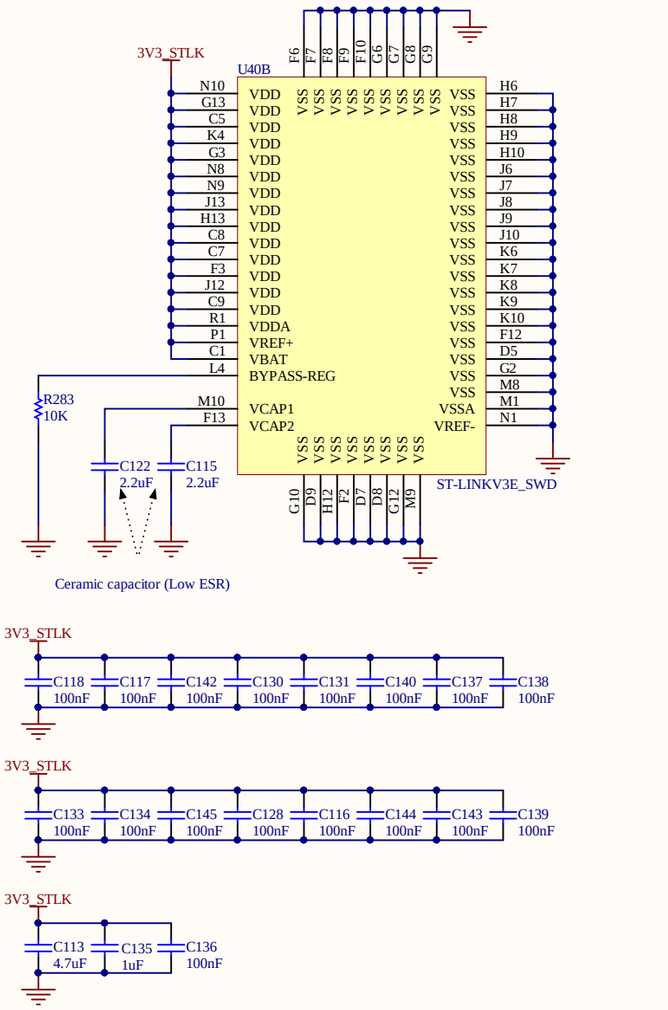
life.augmented

# STLINK V3E SWD

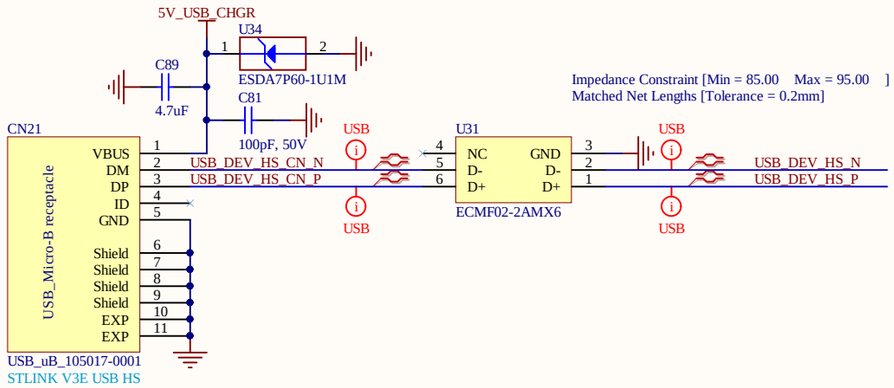
## I/Os



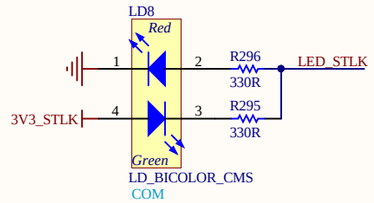

## POWER



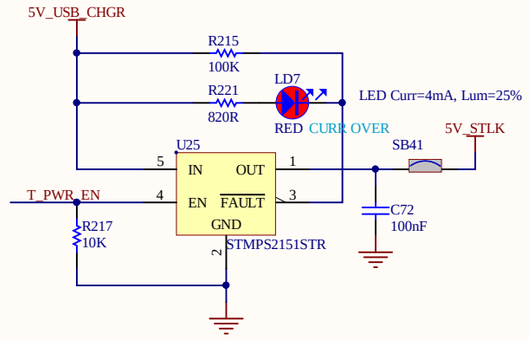

## USB HS



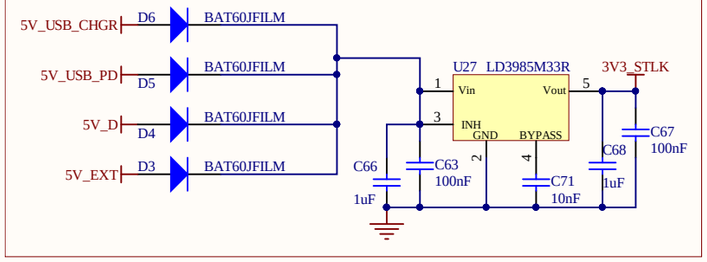

## LED



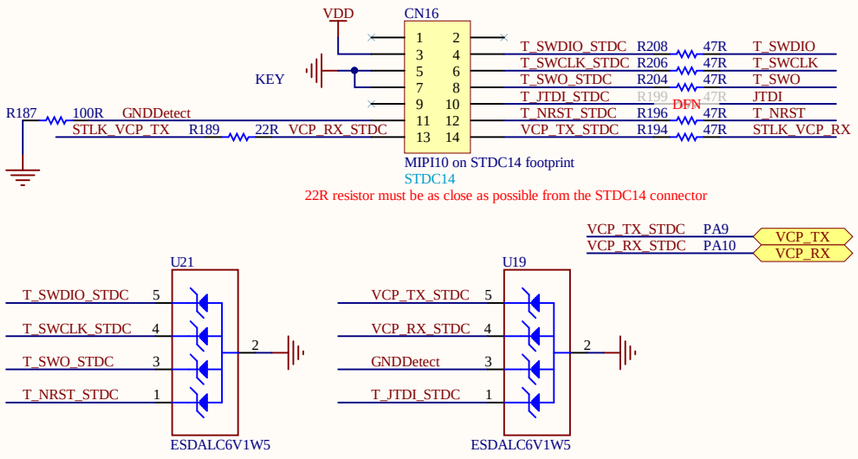

## 5V ST-LINK




## 3.3V ST-LINK




## STDC14 RECEIVER

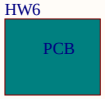



| | | |
|---|---|---|
| Title: **ST-LINK V3 SWD Module** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A3 | Date: 01-NOV-18 | Sheet: 21 of 22 |

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# HW Mechanical parts

HW6




PCB

HW7
MB1397-G474E-B01 syywwxxxxx QR code

BOARD REF

HW8
STM32G474E-EVAL

BOARD CPN

HW2



LOGO ST

HW5



LOGO CE

HW4



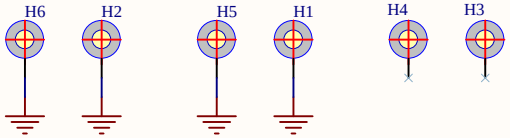
LOGO ESD

HW3



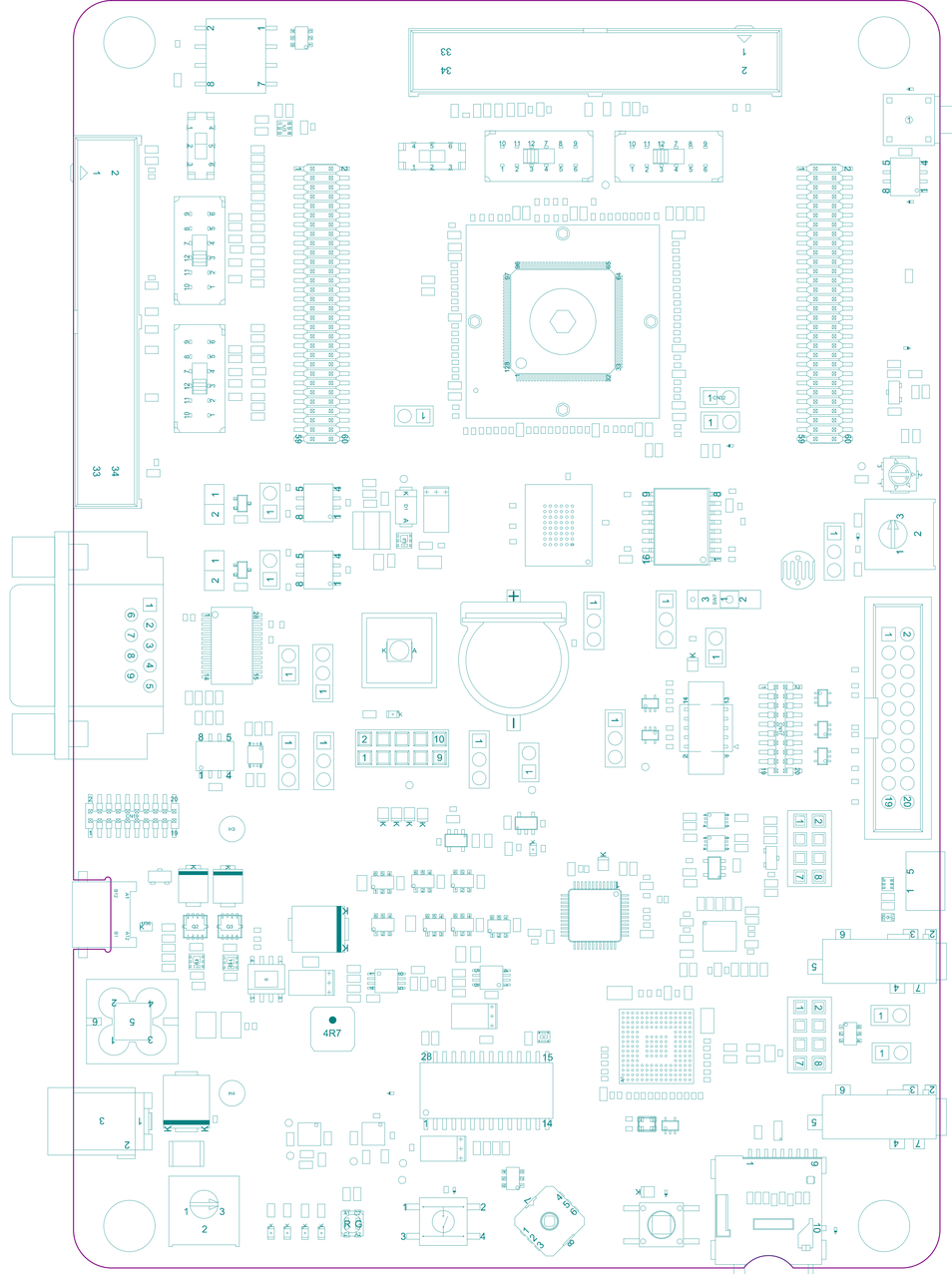
LOGO ROHS

H6 H2 H5 H1 H4 H3



| | | |
|---|---|---|
| Title: **HW_Mechanical_Parts** | | |
| Project: **STM32G474E-EVAL** | | |
| Variant: G474E | | |
| Revision: B-04 | | Reference: MB1397 |
| Size: A4 | Date: 01-NOV-18 | Sheet: 22 of 22 |

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2

LAYER 2 (GND PLANE)

FAB DARWING & DRILL LEGEND

TAB DARWINC & DRILL LEGEND

