U_Connectors
Connectors.SchDoc

PA[0..15]
PB[0..15]
PC[0..15]
PD[0..15]
PE[0..15]
PF[0..15]
PG[0..15]
PH[0..2]
COMP2_INP
BOOT0
NRST

U_ST_LINK_V2-1
ST_LINK_V2-1.SCHDOC

NRST
TCK
TMS
SWO
STLK_RX
STLK_TX
MCO

PWR_ENn

U_MCU_144
MCU_144.SchDoc

PA[0..15]
PB[0..15]
PC[0..15]
PD[0..15]
PE[0..15]
PF[0..15]
PG[0..15]
PH[0..2]
COMP2_INP
BOOT0

NRST
TCK
TMS
SWO
STLK_RX
STLK_TX
MCO

USB_DP
USB_DM
USB_VBUS
USB_ID

USB_GPIO_OUT
USB_GPIO_IN

RMII_TX_EN
RMII_TXD0
RMII_TXD1
RMII_RXD0
RMII_RXD1
RMII_CRS_DV
RMII_MDC
RMII_MDIO
RMII_REF_CLK

NRST

U_USB
USB.SchDoc

USB_DP
USB_DM
USB_VBUS
USB_ID

USB_Disconnect
USB_PowerSwitchOn
USB_OverCurrent
VBUS_DET

U_Ethernet
Ethernet.SchDoc

RMII_TX_EN
RMII_TXD0
RMII_TXD1
RMII_RXD0
RMII_RXD1
RMII_CRS_DV
RMII_MDC
RMII_MDIO
RMII_REF_CLK

NRST

U5
LD1117S50TR
Vin   Vout
      Tab
VIN
C17
10uF(25V)
C18
10uF
VIN_5V

JP3
6 5
4 3
2 1
Header 3X2
+5V

U6   LD39050PU33R
VI   PG
EN   VO
GND GND NC
+3V3
JP5
VDD
+3V3_PER

U5V
SB1   Open
C16
4.7uF
E5V
C11
100nF
R29
1K
C23
1uF_X5R_0603
C22
100nF
C20
1uF_X5R_0603
SB3   Closed
C19
100nF
SB2   Closed

R27
10K
R21
1K
U4
IN   OUT
IN   OUT
FAULT   SET
ON   GND
LD5
Red
R28
2K7
ST890CDR

LD6
Green

Power Switch to supply +5V
from STLINK USB

Note1: Text in italic placed on a wire does not correspond to net name. It just
helps to identify rapidly Arduino's signal related to this wire.
2. Add C58 4.7uF ceramic capacitor on VDD from A-01 to B-01
3. R33's value changed to 200Kohm from A-01 to B-01
4. Add pull-up & pull-down resistors on PB2 for BOOT1 (F4 series) from A-01 to
B-01
5. All peripherals' power changed to +3V3_PER from A-01 to B-01
6. C36 & C37's value changed to 2pF from A-01 to B-01
7. Add R76 1.5K pull-up circuit to USB_DP for F303ZE only from A-01
to B-01
8. LD1 can be controlled by PB0 from A-01 to B-01
9. D11 on CN7 can be set to PB5 from A-01 to B-01
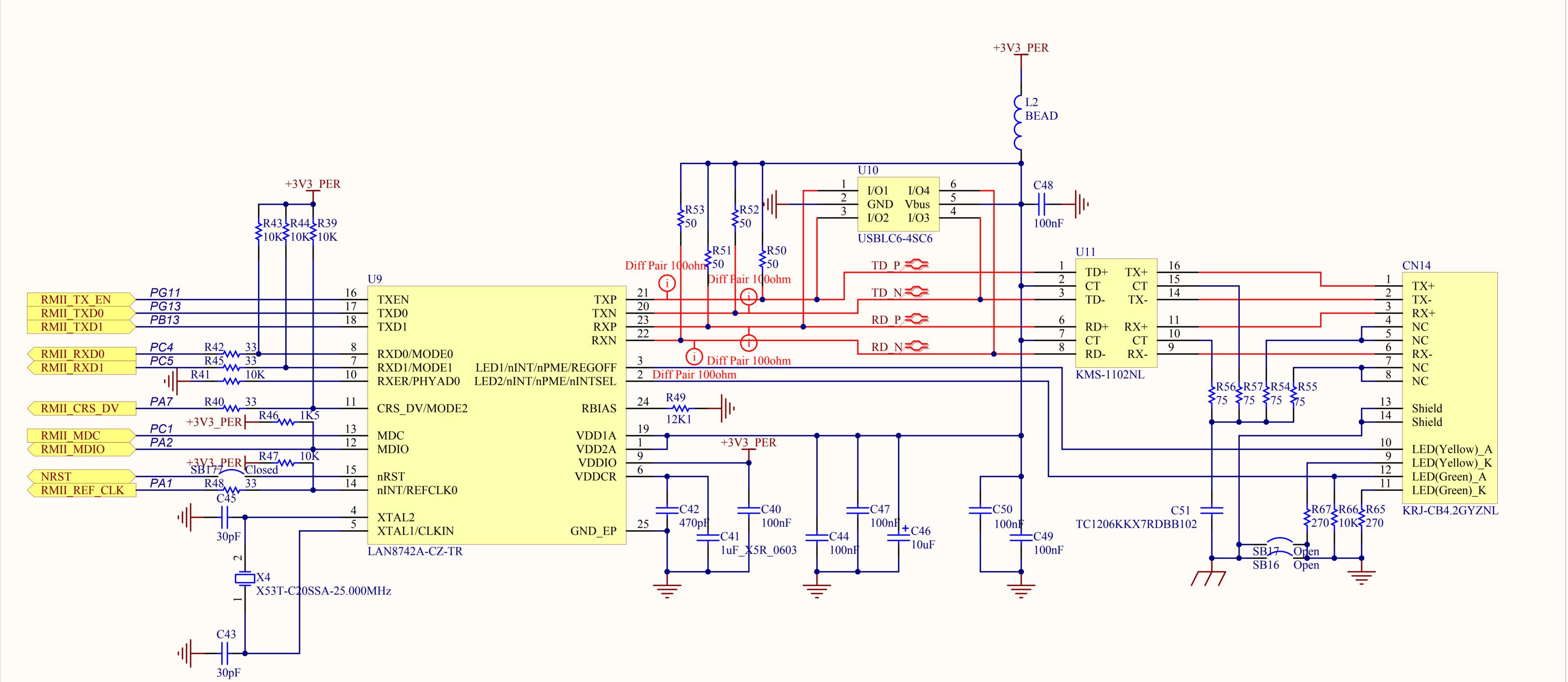
Title: TOP & POWER
Project: NUCLEO-XXXXZX
Size: A4   Reference: MB1137   Revision: B-01
Date: 12/2/2015   Sheet: 1 of 6

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MCU Schematic — NUCLEO-XXXXZX

U8A (MCU_LQFP144)

Left side signals:
- Usr_But — SB180 — Open — PA0 — 34
- RMII_REF_CLK — SB13 — Closed — PA1 — 35
- RMII_MDIO — SB160 — Closed — PA2 — 36
- PA3 — 37
- RMII_CRS_DV / COMP2_INP — JP6 — PA4 — 40
- PA5 — 41
- PA6 — 42
- PA7 — 43
- TP1 — USB_SOF — PA8 — 100
- R35 10K — SB127 — PA9 — 101
- USB_VBUS — SB125 — PA10 — 102
- USB_ID — SB133 — Closed — PA11 — 103
- USB_DM — SB132 — Closed — PA12 — 104
- USB_DP — PA13 — 105
- TMS — PA14 — 109
- TCK — PA15 — 110

R35,SB125 & SB127 removed only for F303ZE

- RMII_MDC — SB164 — Closed — PC0 — 26
- PC1 — 27
- PC2 — 28
- PC3 — 29
- RMII_RXD0 — SB178 — Closed — PC4 — 44
- RMII_RXD1 — SB181 — Closed — PC5 — 45
- PC6 — 96
- PC7 — 97

Right side:
- PB0 — 46
- PB1 — 47
- BOOT1 — R73 100K — PB2 — 48 — SB142 Open / SB152 Open — VDD
- SWO — PB3 — 133
- PB4 — 134
- PB5 — 135
- PB6 — 136
- SB139 Closed — R31 680 — LD2 Blue — PB7 — 137
- PB8 — 139
- PB9 — 140
- PB10 — 69
- PB11 — 70
- PB12 — 71
- JP7 — RMII_TXD1 — PB13 — 74
- SB118 Closed — R30 1K — LD3 Red — PB14 — 75
- PB15 — 76

R73 only fitted on F2 & F4 Series

- PC8 — 98
- PC9 — 99
- PC10 — 111
- PC11 — 112
- PC12 — 113
- PC13 — 7 — SB173 Closed — Usr_But — R59 330 — B1 USER (Blue) — VDD
- PC14-OSC32_IN — 8
- PC15-OSC32_OUT — 9

- R60 100
- C52 [N/A]
- R58 220K

- R38 0 / R37 0
- X2 NX3215SA-32.768KHZ-EXS00A-MU00525
- C36 2pF / C35 2pF — *C35 & C36: 1.5pF for F303ZE*

U8B (MCU_LQFP144)

Left side:
- PD0 — 114
- PD1 — 115
- PD2 — 116
- PD3 — 117
- PD4 — 118
- PD5 — 119
- PD6 — 122
- PD7 — 123
- PD8 — 77
- PD9 — 78
- PD10 — 79
- PD11 — 80
- PD12 — 81
- PD13 — 82
- PD14 — 85
- PD15 — 86
- PE0 — 141
- PE1 — 142
- PE2 — 1
- PE3 — 2
- PE4 — 3
- PE5 — 4
- PE6 — 5
- PE7 — 58
- PE8 — 59
- PE9 — 60
- PE10 — 63
- PE11 — 64
- PE12 — 65
- PE13 — 66
- PE14 — 67
- PE15 — 68

Right side:
- PF0/PH0 — 10 — PF0 /PH0
- PF1/PH1 — 11 — PF1 /PH1
- PF2 — 12 — PF2
- PF3 — 13 — PF3
- PF4 — 14 — PF4
- PF5 — 15 — PF5
- PF6 — 18 — PF6
- PF7 — 19 — PF7
- PF8 — 20 — PF8
- PF9 — 21 — PF9
- PF10 — 22 — PF10
- PF11 — 49 — PF11
- PF12 — 50 — PF12
- PF13 — 53 — PF13
- PF14 — 54 — PF14
- PF15 — 55 — PF15
- PG0 — 56 — PG0
- PG1 — 57 — PG1
- PG2 — 87 — PG2
- PG3 — 88 — PG3
- PG4 — 89 — PG4
- PG5 — 90 — PG5
- PG6 — 91 — PG6
- PG7 — 92 — PG7 — JP4 — USB_GPIO_OUT / USB_GPIO_IN
- PG8 — 93 — PG8
- PG9 — 124 — PG9
- PG10 — 125 — PG10
- PG11 — 126 — PG11 — SB183 Closed — RMII_TX_EN
- PG12 — 127 — PG12
- PG13 — 128 — PG13 — SB182 Closed — RMII_TXD0
- PG14 — 129 — PG14
- PG15 — 132 — PG15

- STLK_RX — SB5 — Closed — USART3_TX
- STLK_TX — SB6 — Closed — USART3_RX

Lower MCU section (MCU_LQFP144)

- MCO — SB149 — Closed
- C37 4.3pF[N/A] — SB8 — Open
- X3 NX3225GD-8.000M-EXS00A-CG04874[N/A]8C
- C38 4.3pF[N/A] — SB9 — Open
- PH0 /PF0 — 23 — PH0/PF0-OSC_IN
- PH1 /PF1 — 24 — PH1/PF1-OSC_OUT
- NRST — 25
- BOOT0 — 138
- VDD — L1 BEAD — SB12 Closed — AVDD — 33 — VDDA
- 32 — VREF+
- VBAT — SB156 Closed — 6 — VBAT
- C57 1uF_X5R_0603
- VSSA/VREF- — 31 — AGND — *L476ZG:VDDUSB & F303ZE:PH2*
- VCAP2/PH2/VDDUSB — 106 — SB123/SB124 — C55 2.2uF_X7R / C56 2.2uF_X7R — PH2
- VCAP1/VSS_1 — 71 — SB129
- VDD — 72 / 108 / 144 — VDD_1 / VDD_2 / VDD_3/VDD_SA
- PDR_ON/VSS_3/NC — 143 — SB154 — *L476ZG/F303ZE:VSS & F207ZG:NC*
- VSS_4/BYPASS_REG — 38 — SB155 Closed — *F407ZG:BYPASS_REG*
- *Ceramic capacitor (Low ESR)*
- VDD_4 — 39
- VDD_5 — 17
- VDD_6 — 52
- VDD_7 — 62
- VDD_8 — 84
- VDD_9/VDDIO_1/VDD_USB33 — 95
- VDD_10 — 121
- VDD_11/VDDIO_2 — 131
- VDD_12/VSSA — 30
- VSS_2 — 107
- VSS_5 — 16
- VSS_6 — 51
- VSS_7 — 61
- VSS_8 — 83
- VSS_9/VSSIO_1 — 94
- VSS_10 — 120
- VSS_11/VSSIO_2 — 130
- *L476ZG/F303ZE:VSSA* — SB161 / SB166 — VDD / AGND

L476ZG/F303ZE:VSS
- BOOT0 — R36 10K
- B2 TD-0341 [RESET/Black]
- C53 100nF
- NRST

Bus labels
- PA[0..15] — PA[0..15]
- PB[0..15] — PB[0..15]
- PC[0..15] — PC[0..15]
- PD[0..15] — PD[0..15]
- PE[0..15] — PE[0..15]
- PF[0..15] — PF[0..15]
- PG[0..15] — PG[0..15]
- PH[0..2] — PH[0..2]

Decoupling capacitors
- VDD: C39 100nF, C30 100nF, C28 100nF, C25 100nF
- VDD: C26 100nF, C29 100nF, C31 100nF, C58 100nF
- VDD: C32 100nF, C33 100nF, C24 100nF, C27 100nF
- VDD: C21 4.7uF_X5R_0603
- SB162 Closed — AGND
- AVDD: C34 100nF — AGND

+3V3_ST_LINK

C1 100nF C12 100nF C13 100nF C3 100nF

D2 BAT60JFILM
R8 2K7 R7 4K7
+5V

+3V3_ST_LINK JP1
R6 100K

Board Ident: PC13=0
R4 10K
R3 10K[N/A]
+3V3_ST_LINK

C6 10pF C5 10pF
X1 NX3225GD-8.000M-EXS00A-CG04874
+3V3_ST_LINK
R5 100K
SB107 Open C2 100nF +3V3_ST_LINK +3V3_PER
R25 4K7 AIN_1
R24 4K7

PWR_EXT USB_RENUMn STM_JTCK

U2 STM32F103CBT6

VDD_3 VSS_3 PB9 PB8 BOOT0 PB7 PB6 PB5 PB4/JNTRST PB3/JTDO PA15/JTDI JTCK/SWCLK
48 47 46 45 44 43 42 41 40 39 38 37

1 VBAT
2 PC13
3 PC14
4 PC15   OSC_IN
5 OSCIN   OSC_OUT
6 OSCOUT   STM_RST
7 NRST
8 VSSA
9 VDDA
10 PA0
11 PA1
12 PA2

VDD_2 36 +3V3_ST_LINK
VSS_2 35
JTMS/SWDIO 34 STM_JTMS
PA12 33 STLINK_USB_DP
PA11 32 STLINK_USB_DM
PA10 31 T_SWO
PA9 30 LED_STLINK
PA8 29 R20 100 SB112 Closed MCO
PB15 28 PWR_ENn
PB14 27 T_JTMS
PB13 26 T_JTCK
PB12 25 T_SWDIO_IN R26 100

C7 20pF[N/A]

PA3 PA4 PA5 PA6 PA7 PB0 PB1 PB2/BOOT1 PB10 PB11 VSS_1 VDD_1
13 14 15 16 17 18 19 20 21 22 23 24

T_JTCK T_JTDO T_JTDI T_NRST T_JRST +3V3_ST_LINK

STLK_TX TX CN5
STLK_RX RX

JP2 R18 [N/A] +3V3_ST_LINK
Not Fitted

SWD
R2 10K
D1 BAT60JFILM
R1 100[N/A] AIN_1

CN6
1 2 3 4 5 6
Header 6X1
R10 22 T_JTCK
R19 22 T_JTMS
R22 22 T_NRST
R23 22 T_SWO

TCK/SWCLK
TMS/SWDIO
T_NRST SB111 Closed
T_SWO SB110 Closed

SWD
TCK
TMS
NRST
SWO

DEFAULT RESERVED

SB101 Closed SB102 Open +3V3_ST_LINK
SB103 Closed SB104 Open STM_JTCK SWCLK
SB105 Closed SB106 Open SWDIO
SB108 Closed SB109 Open STM_JTMS

CN4
1 2 3 4

Jumpers ON --> NUCLEO Selected
Jumpers OFF --> ST-LINK Selected

Wired on Solder Side
CN3
CN2

COM
R17 100 2 LD4 Red 1 +3V3_ST_LINK
LED_STLINK R13 100 3 4 R14 0 +3V3_ST_LINK
Green
LD_BICOLOR_CMS

VIN_5V D4 BAT60JFILM
E5V D3 BAT60JFILM
U5V D5 BAT60JFILM

PWR
U3 LD3985M33R
1 Vin Vout 5 +3V3_ST_LINK
3 INH
GND BYPASS
C14 1uF_X5R_0603
C10 100nF
C15 10nF_X7R_0603
C9 1uF_X5R_0603
C8 100nF

USB ST-LINK
CN1
USB_Micro-B receptacle
1 VBUS
2 DM
3 DP
4 ID
5 GND
6 Shield
7 Shield
8 Shield
9 Shield
10 EXP
11 EXP
1050170001

R11 100K

Diff Pair 90ohm
STLINK_USB_DM
STLINK_USB_DP
Diff Pair 90ohm

U1
1 I/O1 I/O1 6
2 GND   Vbus 5 U5V
3 I/O2 I/O2 4
USBLC6-2SC6
C4 100nF

R9 1K5
+3V3_ST_LINK 3
T1 9013
1 R15 100 USB_RENUMn
2
U5V
R12 10K
R16 36K

Title: STLINK/V2-1
Project: NUCLEO-XXXXZX
Size: A4   Reference: MB1137   Revision: B-01
Date: 8/27/2015   Sheet: 3 of 6

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Remove only for F303ZE

+3V3_PER

R61
620

USB_OverCurrent

PG7

R71
47K

LD7
Red

U12

GND   FAULT   3
IN   OUT   1
EN

STMPS2151STR

CN13

VBUS
DM
DP
ID
GND

Shield
Shield
Shield
Shield
EXP

USB_Micro-AB receptacle

475900001

USB_PowerSwitchOn   PG6   SB187

+5V

2
5
4

SB185

R72
10K

+ C54
4.7uF

Solder only for F303ZE

USB_Disconnect   PG6   SB186

R70
1K5

R62
430K

VBUS_DET   PG7   SB184

R63
620K

USB_VBUS   PA9
USB_DM   PA11
USB_DP   PA12
USB_ID   PA10

Diff Pair 90ohm

Diff Pair 90ohm

+3V3_PER

R64
330

LD8
Green

D6
ESDA6V1BC6

T2
9013

R68
47K

R69
22K

Title: Ethernet PHY with RJ45 connector

Project: NUCLEO-XXXXZX

Size: A4	Reference: MB1137	Revision: B-01
Date: 8/27/2015		Sheet: 5 of 6

life.augmented

Extension connectors

Morpho connector

CN11 — Header 36X2

PC10	1 2	PC11
PC12	3 4	PD2
VDD	5 6	E5V
BOOT0	7 8	
PF6	9 10	
PF7	11 12	IOREF
PA13	13 14	NRST
PA14	15 16	+3V3
PA15	17 18	+5V
	19 20	
PB7	21 22	
PC13	23 24	VIN
PC14 SB144 Open	25 26	PA0
PC15 SB145 Open	27 28	PA1
PF0/PH0 SB148 Open	29 30	PA4
PF1/PH1 SB163 Closed	31 32	PB0
VBAT	33 34	PC2
PC2	35 36	PC1
PC3	37 38	PC0
PD4	39 40	PD3
PD5	41 42	PG2
PD6	43 44	PG3
PD7	45 46	PE2
PE3	47 48	PE4
	49 50	PE5
PF1 /PH1	51 52	PF2
PF0 /PH0	53 54	PF8
PD1	55 56	PF9
PD0	57 58	PG1
PG0	59 60	
PE1	61 62	PE6
PG9	63 64	PG15
PG12	65 66	PG10
PH2	67 68	PG13
PD9 SB4 Closed	69 70	PG11
	71 72	

Zio connector
Arduino Uno compatible

IOREF

CN8 — Header 8X2_Female

	1 2	PC8 D43 SDMMC_D0
NRST	3 4	PC9 D44 SDMMC_D1/I2S_B_CKIN
	5 6	PC10 D45 SDMMC_D2
+3V3	7 8	PC11 D46 SDMMC_D3
+5V	9 10	PC12 D47 SDMMC_CK
	11 12	PD2 D48 SDMMC_CMD
VIN	13 14	PG2 D49 IO
	15 16	PG3 D50 IO

SB174/171/167 Close only for F303ZE
SB165/150/140 Close only for F412ZG

CN9 — Header 15X2_Female

PF3 SB146	A0 PA3	
PD11 SB174	A1 PC0	
PC1 SB165	A2 PC3	
PF5 SB147	A3	
PD12 SB171	A4	
PC4 SB150	A5	
PF10 SB157		
PD13 SB167		
PC5 SB140		

	1 2	PD7 D51 USART_B_SCLK
	3 4	PD6 D52 USART_B_RX
	5 6	PD5 D53 USART_B_TX
	7 8	PD4 D54 USART_B_RTS
	9 10	PD3 D55 USART_B_CTS
	11 12	

SB143/SB138 Close only for I2C on A4/A5
PB9 SB143 Open
PB8 SB138 Open

SB11 Close only for F303ZE PA1 SB11
SB137 Close only for L476ZG PB2 SB137
COMP2_INP SB136 Close only for L476ZG COMP1_INP
PB6 SB136 D72
PF2 SB169 D71
PA8 SB115 D70 I2C_B_SMBA
PH1/PF1 SB170 D69 I2C_B_SCL
PA9 SB128 D68 I2C_B_SDA
PH0/PF0 SB176 D67 CAN_RX PD0
PA10 SB126 D66 CAN_TX PD1
SB115/128/126 Close only for F303ZE D65 IO PG0

PE2 D56 SAI_A_MCLK	13 14	
PE4 D57 SAI_A_FS	15 16	
PE5 D58 SAI_A_SCK	17 18	
PE6 D59 SAI_A_SD	19 20	
PE3 D60 SAI_A_SCK	21 22	
PF8 D61 SAI_B_SCK	23 24	
PF7 D62 SAI_B_MCLK	25 26	
PF9 D63 SAI_B_FS	27 28	
PG1 D64 IO	29 30	

QSPI_BK1_IO3
QSPI_BK1_IO1
QSPI_BK1_IO0
QSPI_BK1_IO2
TIMER_C_PWM1 D32
TIMER_D_PWM1 D33
TIMER_B_ETR D34

Zio connector
Arduino Uno compatible

CN7 — Header 10X2_Female

I2S_A_MCK	D16 PC6	1 2 PB8 D15 I2C_A_SCL
I2S_A_SD	D17 PB15	3 4 PB9 D14 I2C_A_SDA
I2S_A_CK	D18 PB13	5 6
I2S_A_WS	D19 PB12	7 8 AVDD
I2S_B_WS	D20 PA15	9 10 PA5 D13 SPI_A_SCK
I2S_B_MCK	D21 PC7	11 12 PA6 D12 SPI_A_MISO
I2S_B_SD/SPI_B_MOSI	D22 PB5	13 14 D11
I2S_B_CK/SPI_B_SCK	D23 PB3	15 16 PD14 D10 SPI_A_CS/TIM_B_PWM3
SPI_B_NSS	D24 PA4	17 18 PD15 D9 TIMER_B_PWM2
SPI_B_MISO	D25 PB4	19 20 PF12 D8

SB121 Closed PA7 SPI_A_MOSI/TIM_E_PWM1
SB122 Open PB5 SPI_A_MOSI/TIM_D_PWM2

AGND AVDD

ADC_A_IN A6 PB1
ADC_B_IN A7 PC2
ADC_C_IN A8
PF4 SB158 QSPI_CS D26 PB6
PA2 SB159 QSPI_CLK D27 PB2
SB159 Close only for F412ZG

CN10 — Header 17X2_Female

	1 2 PF13 D7	
	3 4 PE9 D6 TIMER_A_PWM1	
	5 6 PE11 D5 TIMER_A_PWM2	
	7 8 PF14 D4	
	9 10 PE13 D3 TIMER_A_PWM3	
	11 12 PF15 D2	
	13 14 SB131 PG14	
	15 16 SB151 PC4 D1	
		SB130 PG9 USART_A_TX

SB151/141 Close only for F303ZE
SB130/135 Close only for L476ZG

SB134 PG9 D0
SB141 PC5 USART_A_RX
SB135 PG10

SB10/14/15 Close only for F303ZE

D28 PD13 SB168
PF10 SB10
D29 PD12 SB172
PF5 SB14
D30 PD11 SB175
PF3 SB15
D31
PA0 SB179 Closed

	17 18 PE8 D42 TIMER_A_PWM1N	
	19 20 PE7 D41 TIMER_A_ETR	
	21 22 PE10 D40 TIMER_A_PWM2N	
	23 24 PE12 D39 TIMER_A_PWM3N	
	25 26 PE14 D38 TIMER_A_BKIN2	
	27 28 PE15 D37 TIMER_A_BKIN1	
	29 30 PB10 D36 TIMER_C_PWM2	
	31 32 PB10 D36	
	33 34 PB11 D35 TIMER_C_PWM3	

PE2

Morpho connector

CN12 — Header 36X2

PC9 SB117 Closed	1 2	PC6 SB116 PC8 Closed
PB8	3 4	PC6
PB9	5 6	PC5
AVDD	7 8	U5V
	9 10	Closed SB7 PD8
PA5	11 12	PA12
PA6	13 14	PA11
PA7	15 16	PB12
PB6	17 18	PB11
PC7	19 20	
PA9	21 22	PB2
PA8	23 24	PB1
PB10	25 26	PB15
PB5	27 28	PB14
PB3	29 30	PB13
PA10	31 32	PC4
PA2	33 34	PF5
PA3	35 36	PF4
	37 38	
PD13	39 40	PE8
PD12	41 42	PF10
PD11	43 44	PD14
PE14	45 46	PD15
PE12	47 48	
PE14	49 50	PE9
PE15	51 52	
PE13	53 54	PE11
PF13	55 56	PF3
PF12	57 58	PF15
PG14	59 60	PF11
	61 62	PE0
PD10	63 64	PG8
PG7	65 66	PG5
PG4	67 68	PG6
	69 70	
	71 72	

AGND

+3V3 SB114 Closed IOREF
+3V3_PER SB113 Open

PA[0..15] PA[0..15]
PB[0..15] PB[0..15]
PC[0..15] PC[0..15]
PD[0..15] PD[0..15]
PE[0..15] PE[0..15]
PF[0..15] PF[0..15]
PG[0..15] PG[0..15]
PH[0..2] PH[0..2]
NRST NRST
BOOT0 BOOT0

+3V3_PER
R32 510
U7 TSV631AILT
R33 200K
R34 10K
SB120 Closed PB0
SB119 Open PA5
LD1 Green