REV.	DESCRIPTION	DATE	APPROVED
D.1	PCB redesigned for reduced emissions	2017-04-11	J Johnson

F1
Fiducial

F2
Fiducial

F3
Fiducial

S1

Standoff, Hex, 10mm, M2.5

S3

Standoff, Hex, 10mm, M2.5

S2

Standoff, Hex, 10mm, M2.5

S4

Standoff, Hex, 10mm, M2.5

Plated Hole, M2.5
H3
C112
1000pF
10%
2kV
GND

Plated Hole, M2.5
H9
C113
1000pF
10%
2kV
GND

U_EthernetPHY0
EthernetPHY0.SchDoc

E0_RESET_N
E0_RX_CLK
E0_RX_CTRL
E0_RXD0
E0_RXD1
E0_RXD2
E0_RXD3
E0_TXD0
E0_TXD1
E0_TXD2
E0_TXD3
E0_TX_CLK
E0_TX_CTRL
E0_MDIO
E0_MDC

U_FMCConnector
FMCConnector.SchDoc

E0_RESET_N
E0_RX_CLK
E0_RX_CTRL
E0_RXD0
E0_RXD1
E0_RXD2
E0_RXD3
E0_TXD0
E0_TXD1
E0_TXD2
E0_TXD3
E0_TX_CLK
E0_TX_CTRL
E0_MDIO
E0_MDC

U_EthernetPHY1
EthernetPHY1.SchDoc

E1_RESET_N
E1_RX_CLK
E1_RX_CTRL
E1_RXD0
E1_RXD1
E1_RXD2
E1_RXD3
E1_TXD0
E1_TXD1
E1_TXD2
E1_TXD3
E1_TX_CLK
E1_TX_CTRL
E1_MDIO
E1_MDC

E1_RESET_N
E1_RX_CLK
E1_RX_CTRL
E1_RXD0
E1_RXD1
E1_RXD2
E1_RXD3
E1_TXD0
E1_TXD1
E1_TXD2
E1_TXD3
E1_TX_CLK
E1_TX_CTRL
E1_MDIO
E1_MDC

U_EthernetPHY2
EthernetPHY2.SchDoc

E2_RESET_N
E2_RX_CLK
E2_RX_CTRL
E2_RXD0
E2_RXD1
E2_RXD2
E2_RXD3
E2_TXD0
E2_TXD1
E2_TXD2
E2_TXD3
E2_TX_CLK
E2_TX_CTRL
E2_MDIO
E2_MDC

E2_RESET_N
E2_RX_CLK
E2_RX_CTRL
E2_RXD0
E2_RXD1
E2_RXD2
E2_RXD3
E2_TXD0
E2_TXD1
E2_TXD2
E2_TXD3
E2_TX_CLK
E2_TX_CTRL
E2_MDIO
E2_MDC

U_EthernetPHY3
EthernetPHY3.SchDoc

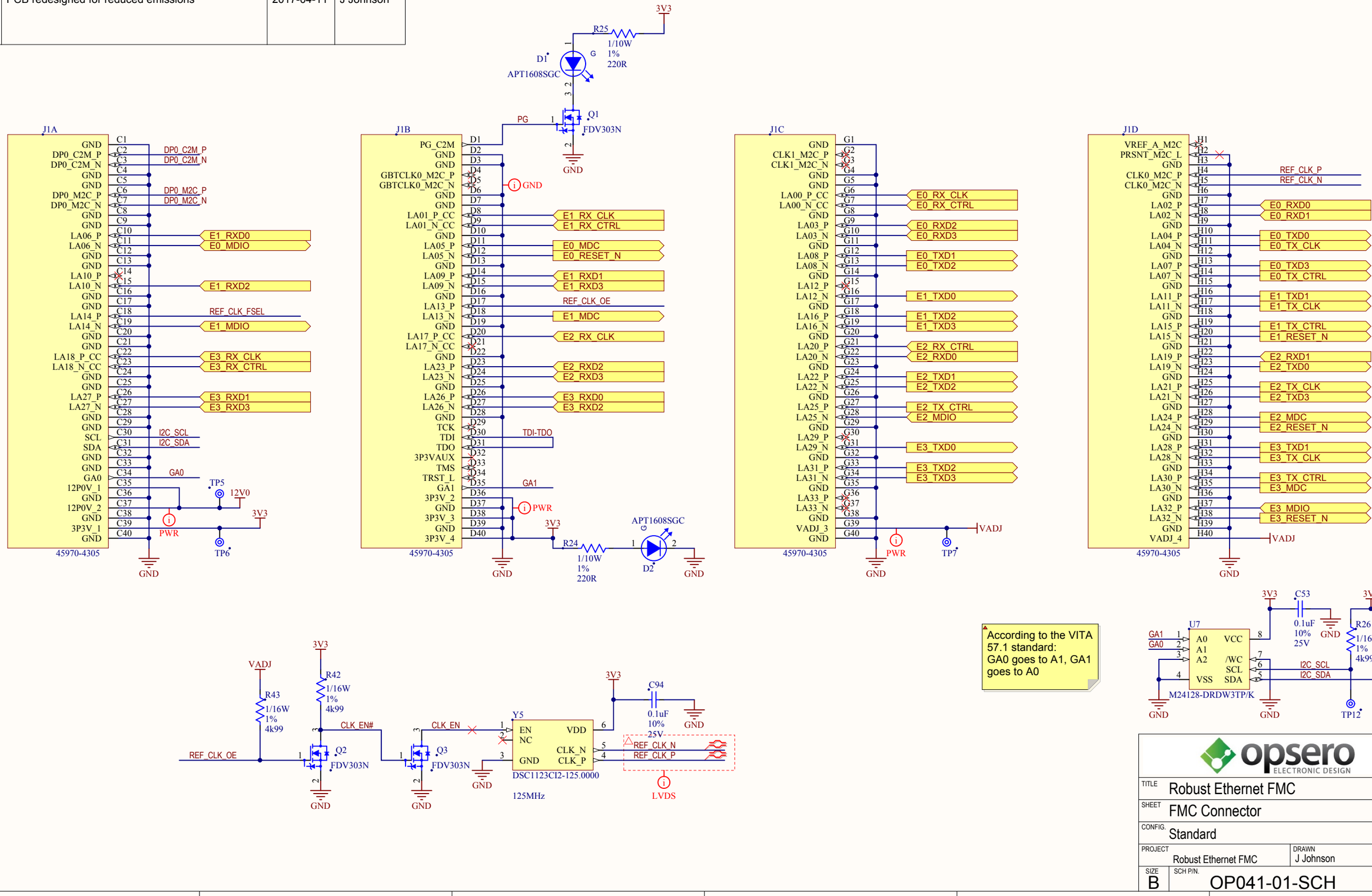
E3_RESET_N
E3_RX_CLK
E3_RX_CTRL
E3_RXD0
E3_RXD1
E3_RXD2
E3_RXD3
E3_TXD0
E3_TXD1
E3_TXD2
E3_TXD3
E3_TX_CLK
E3_TX_CTRL
E3_MDIO
E3_MDC

E3_RESET_N
E3_RX_CLK
E3_RX_CTRL
E3_RXD0
E3_RXD1
E3_RXD2
E3_RXD3
E3_TXD0
E3_TXD1
E3_TXD2
E3_TXD3
E3_TX_CLK
E3_TX_CTRL
E3_MDIO
E3_MDC

opsero ELECTRONIC DESIGN

TITLE	Robust Ethernet FMC		
SHEET	Top level		
CONFIG.	Standard		
PROJECT	Robust Ethernet FMC	DRAWN J Johnson	DATE 2014-09-11
SIZE B	SCH P/N. OP041-01-SCH	REV. D.1	SHEET 1 OF 6

REV.	DESCRIPTION	DATE	APPROVED
D.1	PCB redesigned for reduced emissions	2017-04-11	J Johnson



opsero ELECTRONIC DESIGN

TITLE	Robust Ethernet FMC
SHEET	FMC Connector
CONFIG.	Standard
PROJECT	Robust Ethernet FMC
DRAWN	J Johnson
DATE	2014-09-11
SIZE	B
SCH P/N.	OP041-01-SCH
REV.	D.1
SHEET OF	2 6

REV.	DESCRIPTION	DATE	APPROVED
D.1	PCB redesigned for reduced emissions	2017-04-11	J Johnson

VDDO (VADJ) supplies MDC, MDIO, RESET_N, LED[2:0], CONFIG, CLK125 and RGMII pins, therefore no voltage conversion required to the FMC connector.

The standard configuration is for a VADJ voltage of 2.5V. For a VADJ of 3.3V or 1.8V, hardware modifications are required.

For VDDO (VADJ) of 3.3V, the CONFIG pin should be tied to GND and the 0R resistor removed. The 88E1510 device will support a VDDO (VADJ) of 3.3V or 2.5V, however be aware that the Xilinx Series 7 devices only support 2.5V or 1.8V RGMII.

For VDDO (VADJ) of 1.8V, the 88E1518 device should be used.

Routing note:
P/N traces must be matched to 30mils

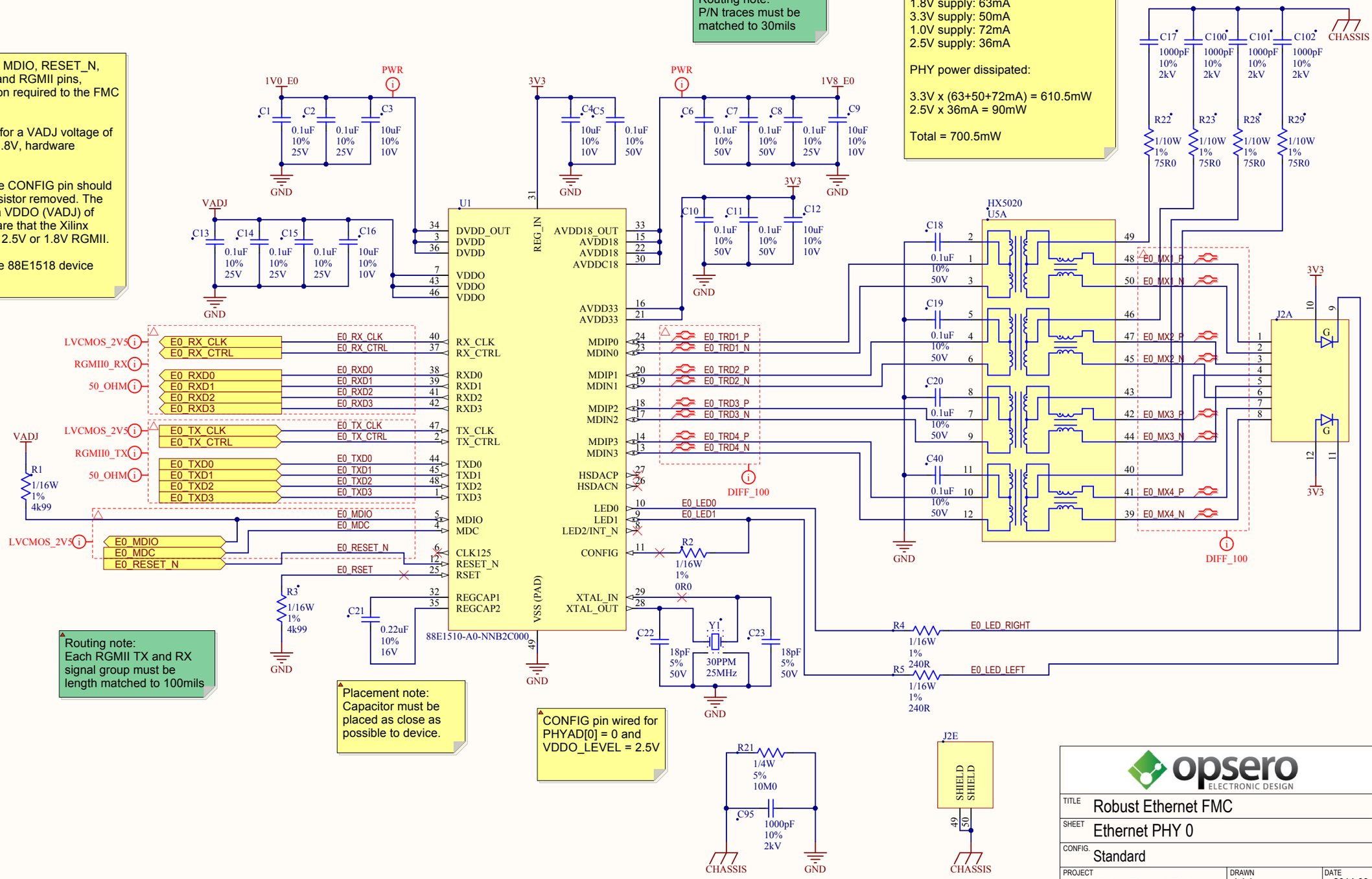
PHY current consumption:

1.8V supply: 63mA
3.3V supply: 50mA
1.0V supply: 72mA
2.5V supply: 36mA

PHY power dissipated:

3.3V x (63+50+72mA) = 610.5mW
2.5V x 36mA = 90mW

Total = 700.5mW



Routing note:
Each RGMII TX and RX signal group must be length matched to 100mils

Placement note:
Capacitor must be placed as close as possible to device.

CONFIG pin wired for PHYAD[0] = 0 and VDDO_LEVEL = 2.5V

opsero ELECTRONIC DESIGN

TITLE	Robust Ethernet FMC
SHEET	Ethernet PHY 0
CONFIG.	Standard
PROJECT	Robust Ethernet FMC
DRAWN	J Johnson
DATE	2014-09-11
SIZE	B
SCH P/N.	OP041-01-SCH
REV.	D.1
SHEET	3 OF 6

REV.	DESCRIPTION	DATE	APPROVED
D.1	PCB redesigned for reduced emissions	2017-04-11	J Johnson

VDDO (VADJ) supplies MDC, MDIO, RESET_N, LED[2:0], CONFIG, CLK125 and RGMII pins, therefore no voltage conversion required to the FMC connector.

The standard configuration is for a VADJ voltage of 2.5V. For a VADJ of 3.3V or 1.8V, hardware modifications are required.

For VDDO (VADJ) of 3.3V, the CONFIG pin should be tied to GND and the 0R resistor removed. The 88E1510 device will support a VDDO (VADJ) of 3.3V or 2.5V, however be aware that the Xilinx Series 7 devices only support 2.5V or 1.8V RGMII.

For VDDO (VADJ) of 1.8V, the 88E1518 device should be used.

Routing note:
P/N traces must be matched to 30mils

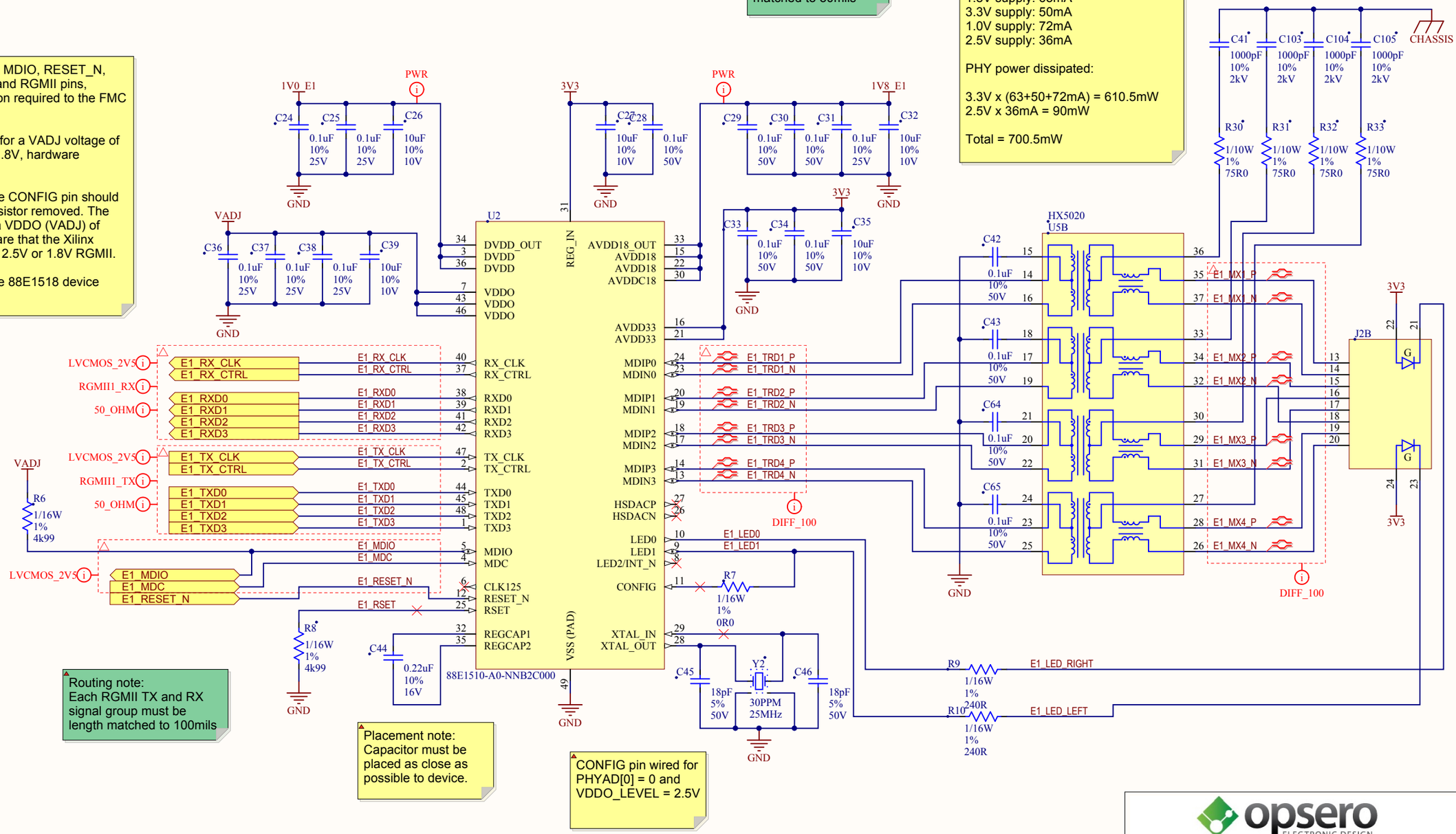
PHY current consumption:

1.8V supply: 63mA
3.3V supply: 50mA
1.0V supply: 72mA
2.5V supply: 36mA

PHY power dissipated:

3.3V x (63+50+72mA) = 610.5mW
2.5V x 36mA = 90mW

Total = 700.5mW



Routing note:
Each RGMII TX and RX signal group must be length matched to 100mils

Placement note:
Capacitor must be placed as close as possible to device.

CONFIG pin wired for PHYAD[0] = 0 and VDDO_LEVEL = 2.5V

opsero ELECTRONIC DESIGN

TITLE	Robust Ethernet FMC
SHEET	Ethernet PHY 1
CONFIG.	Standard
PROJECT	Robust Ethernet FMC
DRAWN	J Johnson
DATE	2014-09-11
SIZE	B
SCH P/N.	OP041-01-SCH
REV.	D.1
SHEET	4 OF 6

REV.	DESCRIPTION	DATE	APPROVED
D.1	PCB redesigned for reduced emissions	2017-04-11	J Johnson

VDDO (VADJ) supplies MDC, MDIO, RESET_N, LED[2:0], CONFIG, CLK125 and RGMII pins, therefore no voltage conversion required to the FMC connector.

The standard configuration is for a VADJ voltage of 2.5V. For a VADJ of 3.3V or 1.8V, hardware modifications are required.

For VDDO (VADJ) of 3.3V, the CONFIG pin should be tied to GND and the 0R resistor removed. The 88E1510 device will support a VDDO (VADJ) of 3.3V or 2.5V, however be aware that the Xilinx Series 7 devices only support 2.5V or 1.8V RGMII.

For VDDO (VADJ) of 1.8V, the 88E1518 device should be used.

Routing note:
P/N traces must be matched to 30mils

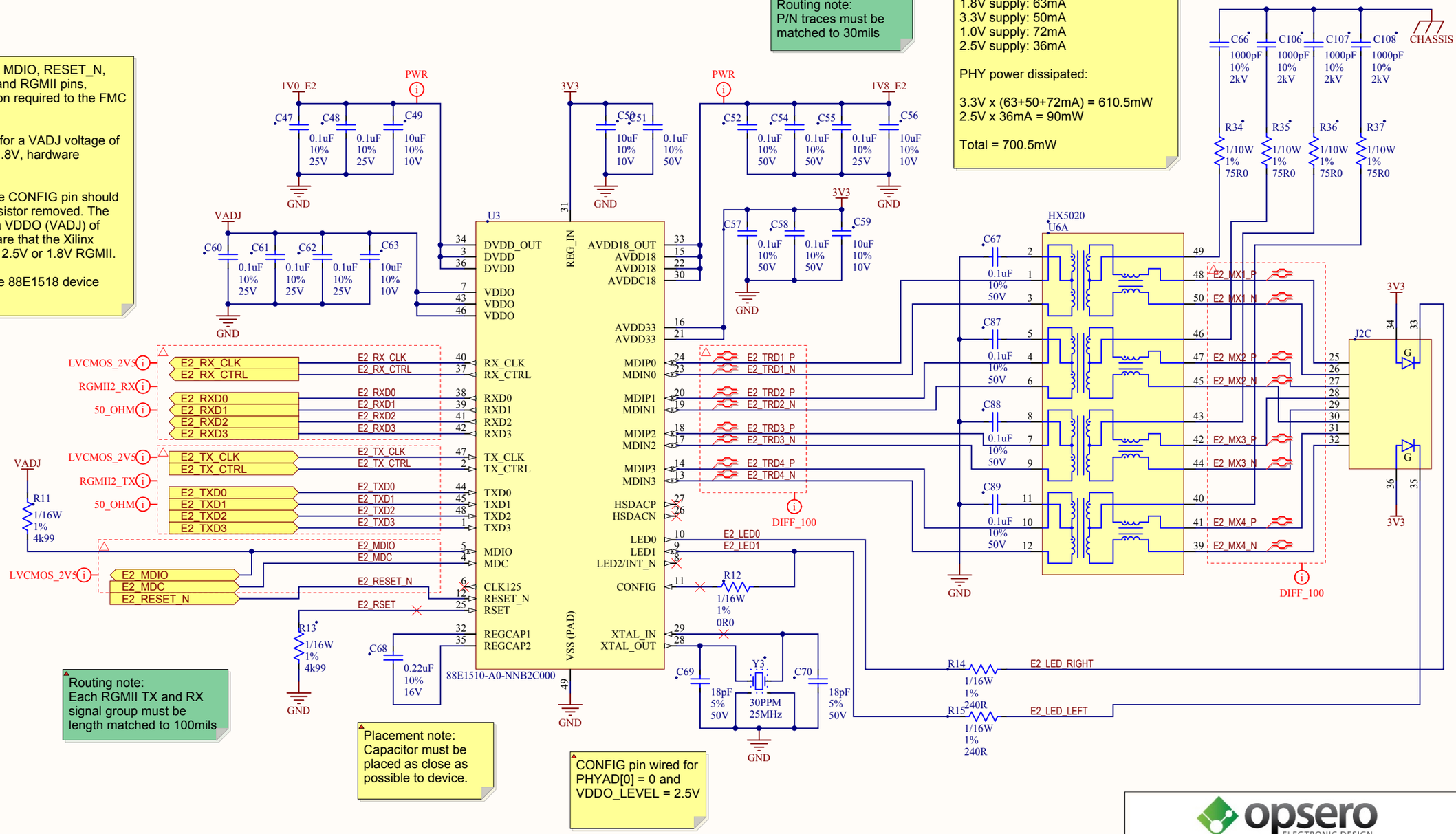
PHY current consumption:

1.8V supply: 63mA
3.3V supply: 50mA
1.0V supply: 72mA
2.5V supply: 36mA

PHY power dissipated:

3.3V x (63+50+72mA) = 610.5mW
2.5V x 36mA = 90mW

Total = 700.5mW



Routing note:
Each RGMII TX and RX signal group must be length matched to 100mils

Placement note:
Capacitor must be placed as close as possible to device.

CONFIG pin wired for PHYAD[0] = 0 and VDDO_LEVEL = 2.5V

opsero ELECTRONIC DESIGN

TITLE	Robust Ethernet FMC
SHEET	Ethernet PHY 2
CONFIG.	Standard
PROJECT	Robust Ethernet FMC
DRAWN	J Johnson
DATE	2014-09-11
SIZE	B
SCH P/N.	OP041-01-SCH
REV.	D.1
SHEET	5 OF 6

REV.	DESCRIPTION	DATE	APPROVED
D.1	PCB redesigned for reduced emissions	2017-04-11	J Johnson

VDDO (VADJ) supplies MDC, MDIO, RESET_N, LED[2:0], CONFIG, CLK125 and RGMII pins, therefore no voltage conversion required to the FMC connector.

The standard configuration is for a VADJ voltage of 2.5V. For a VADJ of 3.3V or 1.8V, hardware modifications are required.

For VDDO (VADJ) of 3.3V, the CONFIG pin should be tied to GND and the 0R resistor removed. The 88E1510 device will support a VDDO (VADJ) of 3.3V or 2.5V, however be aware that the Xilinx Series 7 devices only support 2.5V or 1.8V RGMII.

For VDDO (VADJ) of 1.8V, the 88E1518 device should be used.

Routing note:
P/N traces must be matched to 30mils

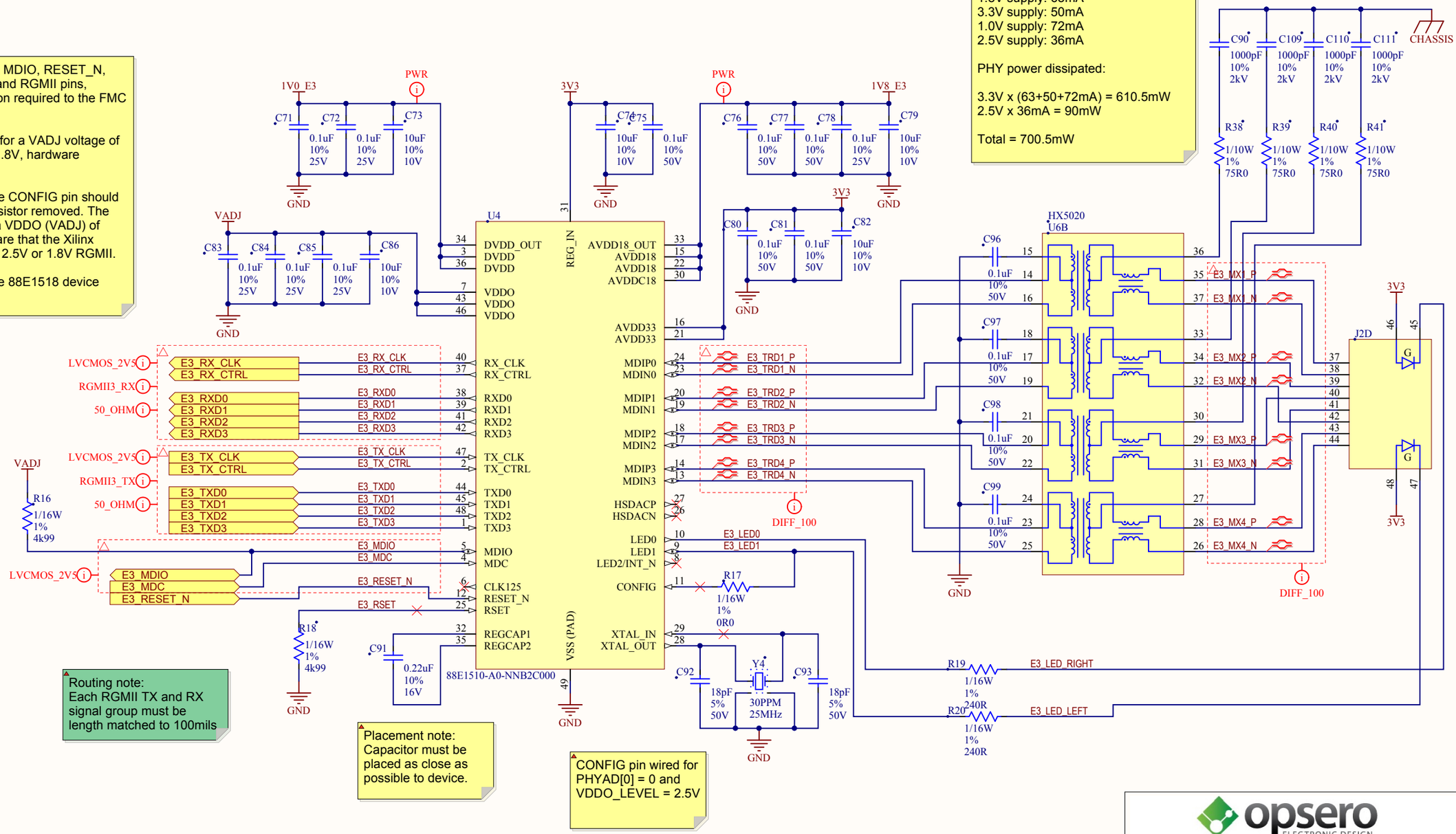
PHY current consumption:

1.8V supply: 63mA
3.3V supply: 50mA
1.0V supply: 72mA
2.5V supply: 36mA

PHY power dissipated:

3.3V x (63+50+72mA) = 610.5mW
2.5V x 36mA = 90mW

Total = 700.5mW



Routing note:
Each RGMII TX and RX signal group must be length matched to 100mils

Placement note:
Capacitor must be placed as close as possible to device.

CONFIG pin wired for PHYAD[0] = 0 and VDDO_LEVEL = 2.5V

opsero ELECTRONIC DESIGN

TITLE	Robust Ethernet FMC
SHEET	Ethernet PHY 3
CONFIG.	Standard
PROJECT	Robust Ethernet FMC
DRAWN	J Johnson
DATE	2014-09-11
SIZE	B
SCH P/N.	OP041-01-SCH
REV.	D.1
SHEET	6 OF 6