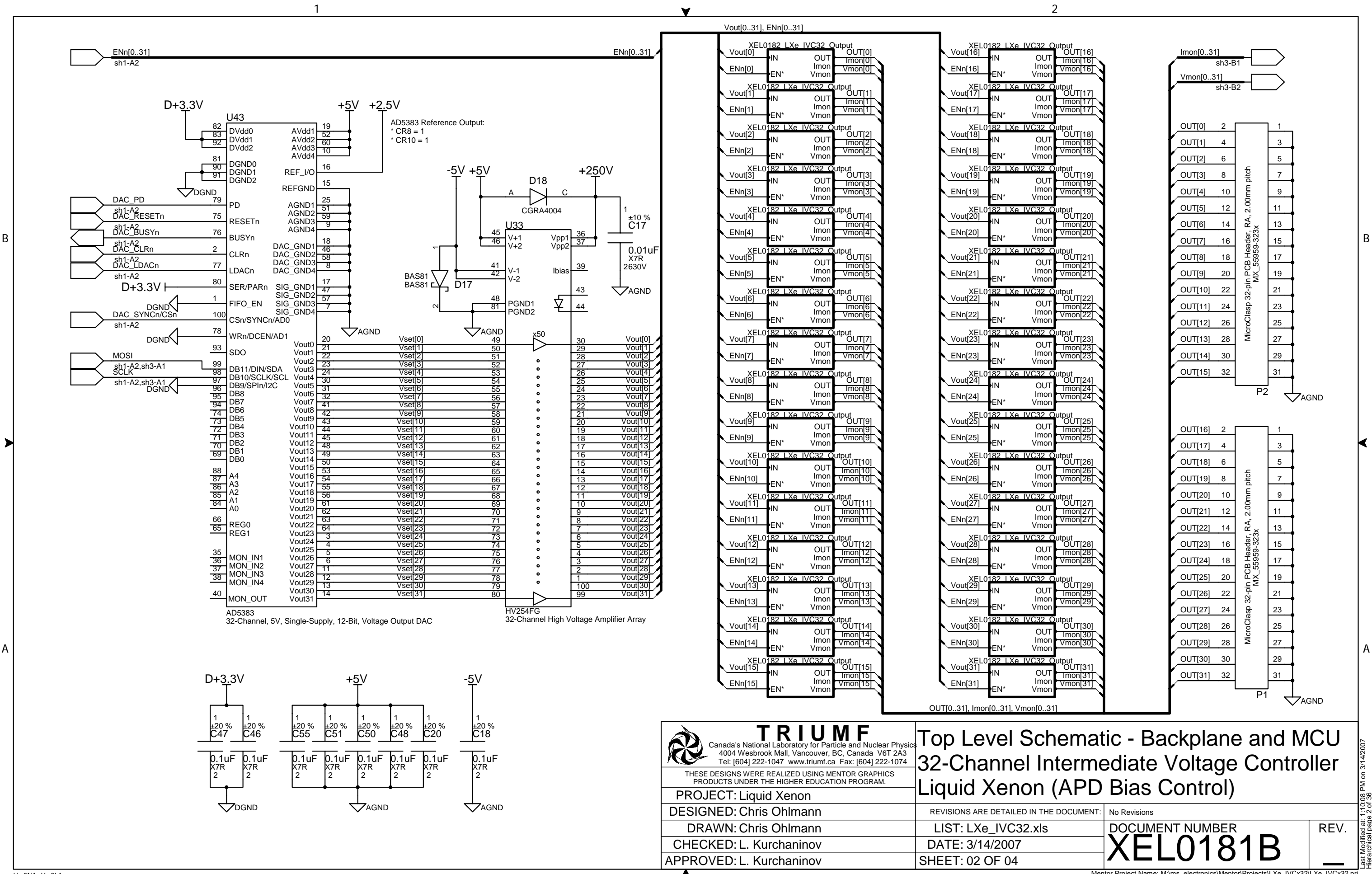


**TRIUMF**  
Canada's National Laboratory for Particle and Nuclear Physics  
4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3  
Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074

THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.

|                          |
|--------------------------|
| PROJECT: Liquid Xenon    |
| DESIGNED: Chris Ohlmann  |
| DRAWN: Chris Ohlmann     |
| CHECKED: L. Kurchaninov  |
| APPROVED: L. Kurchaninov |

|   |                 |
|---|-----------------|
| Top Level Schematic - Output<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |                 |
| REVISIONS ARE DETAILED IN THE DOCUMENT:   | No Revisions    |
| LIST: LXe_IVC32.xls   | DATE: 3/14/2007 |
| DOCUMENT NUMBER<br><b>XEL0181B</b>  | REV. <b>1</b>   |
| SHEET: 01 OF 04   |                 |





**TRIUMF**  
Canada's National Laboratory for Particle and Nuclear Physics  
4004 Westbrook Mall, Vancouver, BC, Canada V6T 2A3  
Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074  
THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.

PROJECT: Liquid Xenon

DESIGNED: Chris Ohlmann

DRAWN: Chris Ohlmann

CHECKED: L. Kurchaninov

APPROVED: L. Kurchaninov

REVISIONS ARE DETAILED IN THE DOCUMENT:

LIST: LXe\_IVC32.xls

DATE: 3/14/2007

SHEET: 02 OF 04

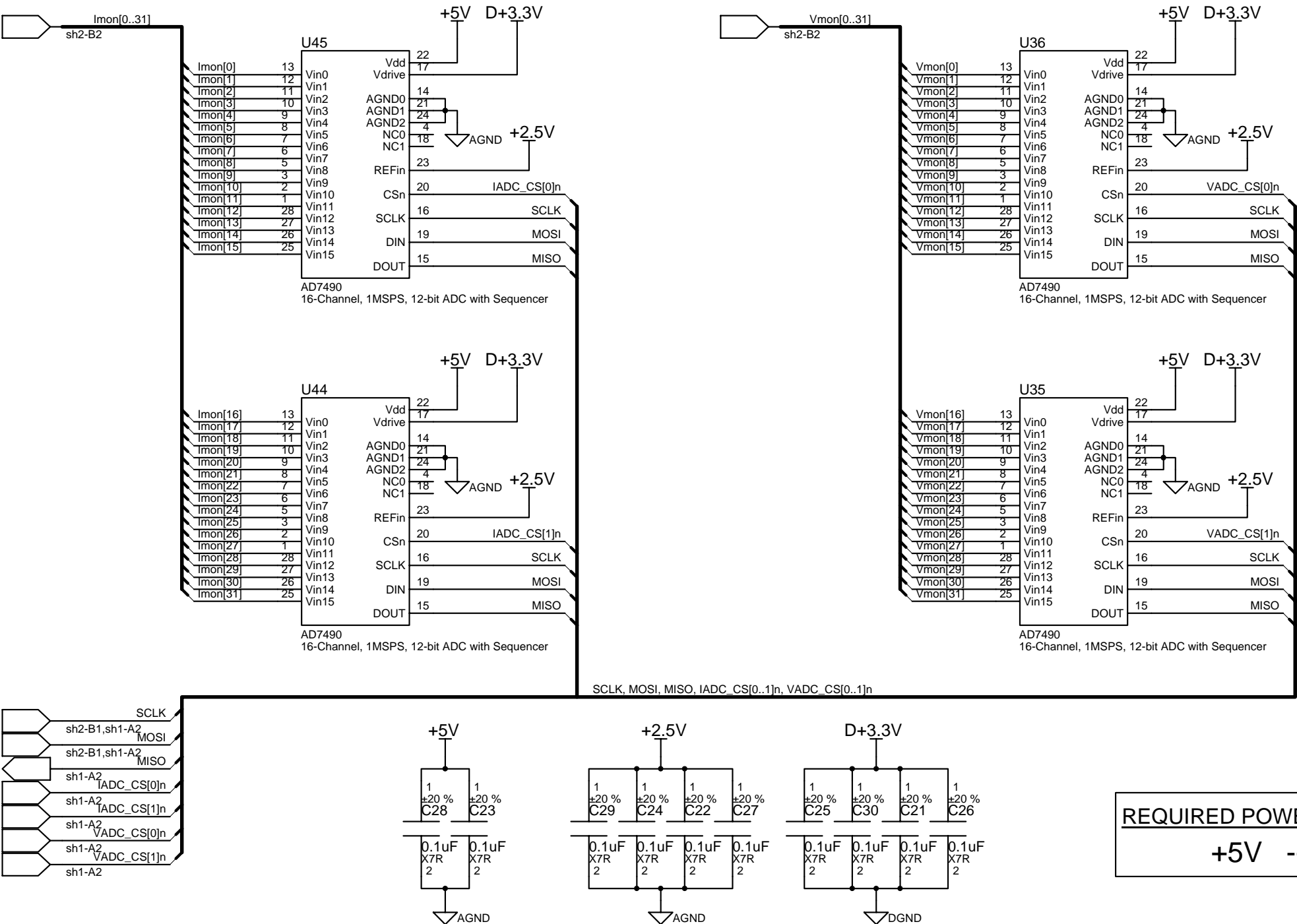
DOCUMENT NUMBER


**XEL0181B**

REV.

# Top Level Schematic - Backplane and MCU 32-Channel Intermediate Voltage Controller Liquid Xenon (APD Bias Control)

Last Modified at: 1:10:08 PM on 3/14/2007  
Current Library Name: M:\ms\_electronics\mentor\libraries\MS\_Elx\_CL\Inc  
PCB File Name: @PCBFileName





**TRIUMF**  
Canada's National Laboratory for Particle and Nuclear Physics  
4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3  
Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074

THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.

PROJECT: Liquid Xenon

DESIGNED: Chris Ohlmann

DRAWN: Chris Ohlmann

CHECKED: L. Kurchaninov

APPROVED: L. Kurchaninov

Top Level Schematic - Output Monitoring  
32-Channel Intermediate Voltage Controller  
Liquid Xenon (APD Bias Control)

REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions

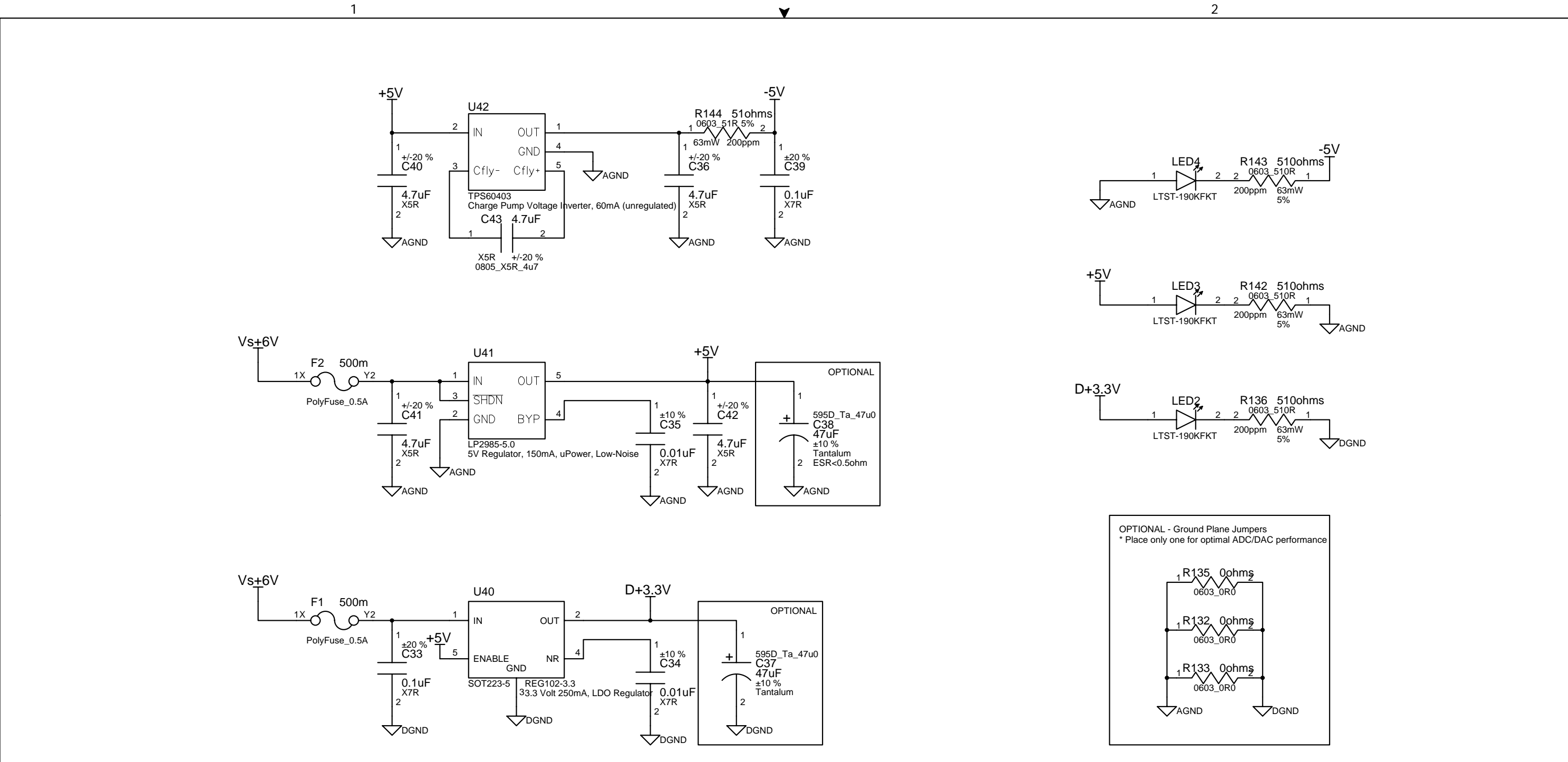
LIST: LXe\_IVC32.xls


DATE: 3/14/2007

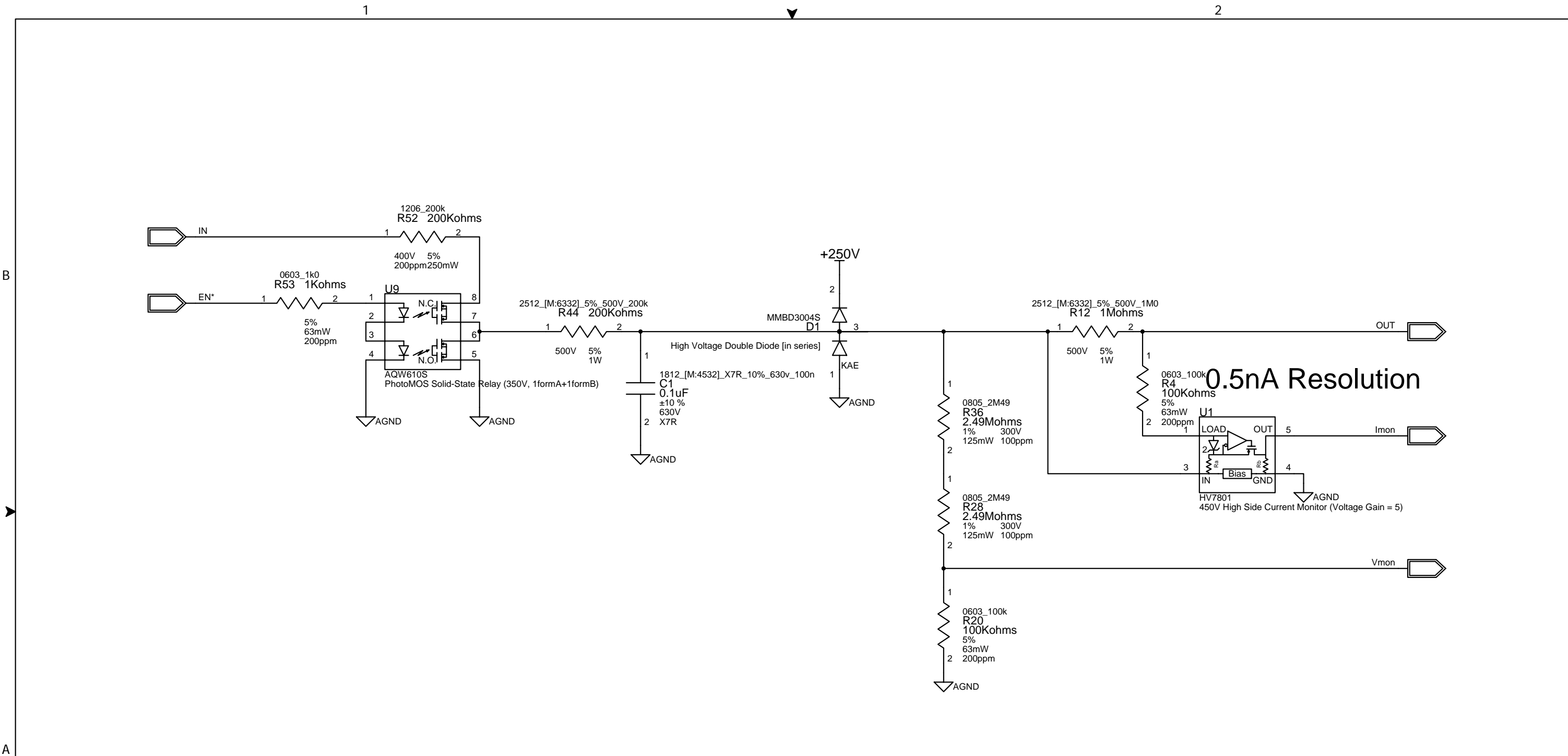
SHEET: 03 OF 04


DOCUMENT NUMBER  
**XEL0181B**

REV.  
**1**

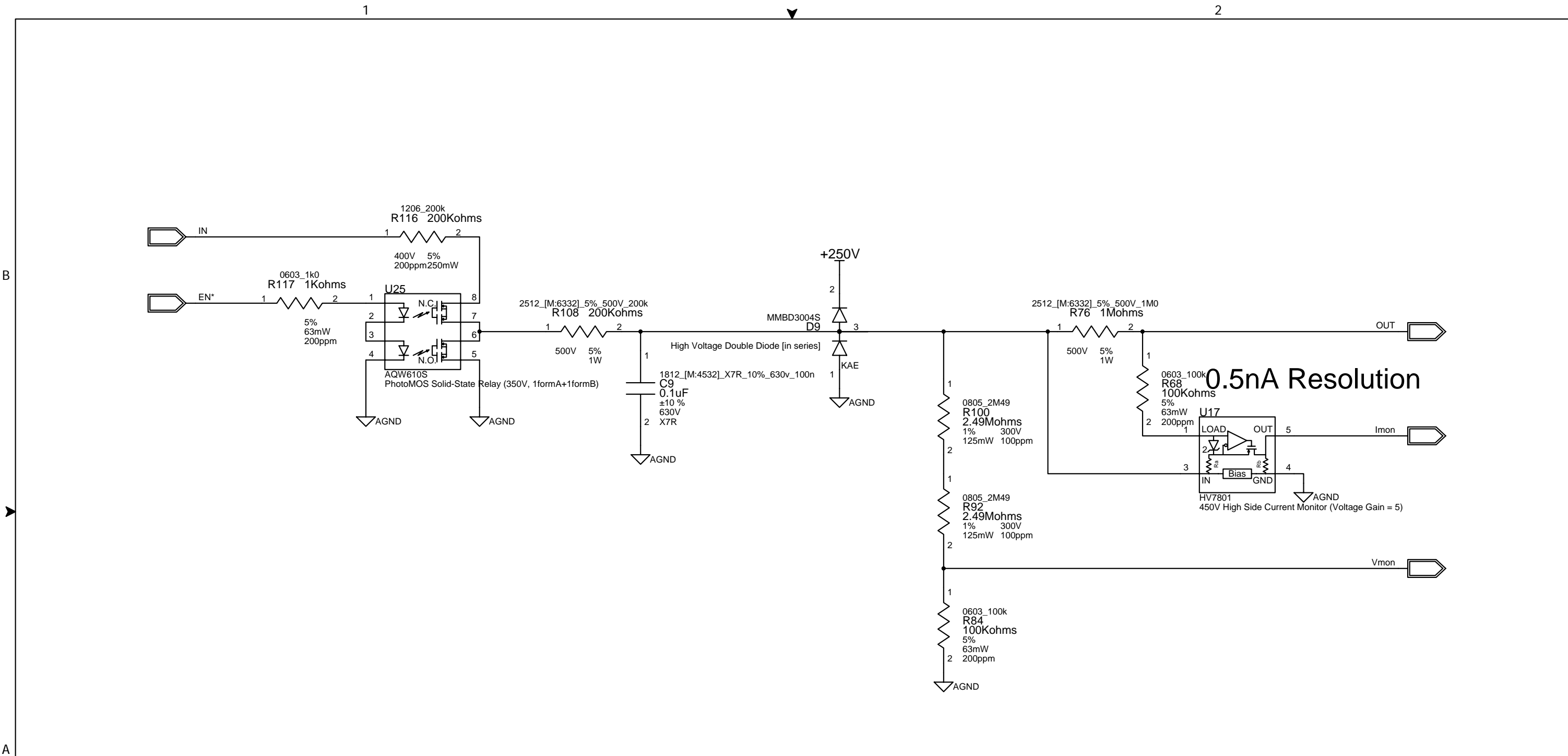


|  |   |   |  |
|--|---|---|--|
| <div><div></div><div><div>Canada's National Laboratory for Particle and Nuclear Physics</div><div>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3</div><div>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div></div></div> | Top Level Schematic - Voltage Regulators<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |   |  |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |   | REVISIONS ARE DETAILED IN THE DOCUMENT: |  |
| PROJECT: Liquid Xenon  |   | No Revisions                            |  |
| DESIGNED: Chris Ohlmann  |   | LIST: LXe_IVC32.xls                     |  |
| DRAWN: Chris Ohlmann   |   | DATE: 3/14/2007                         |  |
| CHECKED: L. Kurchaninov  |   | DOCUMENT NUMBER                         |  |
| APPROVED: L. Kurchaninov   |   | XEL0181B                                |  |
|  |   | REV.                                    |  |
|  |   | SHEET: 04 OF 04                         |  |




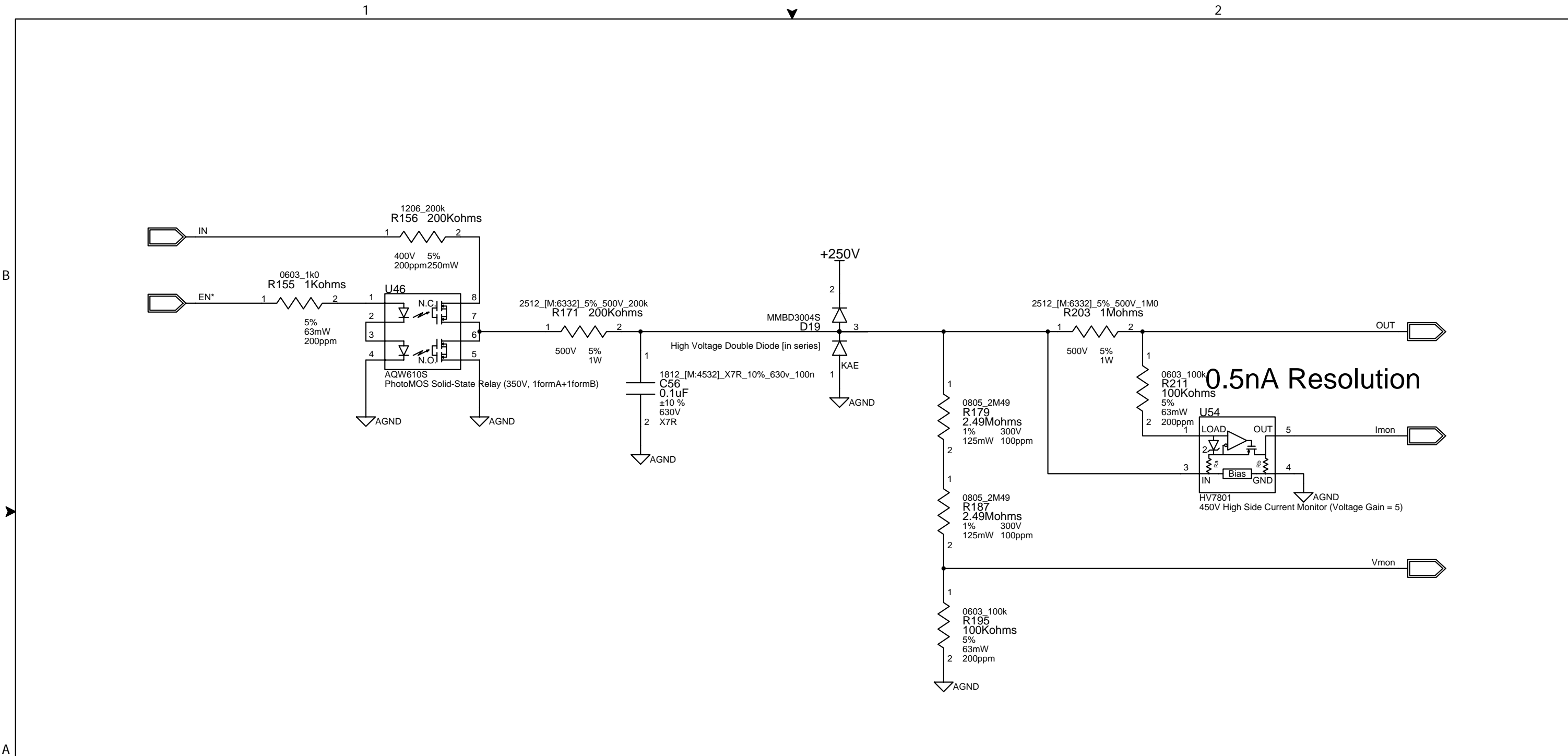
|  |  |                 |
|--|--|-----------------|
| <div><div></div><div><div>Canada's National Laboratory for Particle and Nuclear Physics</div><div>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3</div><div>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div></div></div> | Output Channel Block Schematic             |                 |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   | 32-Channel Intermediate Voltage Controller |                 |
| PROJECT: Liquid Xenon  | Liquid Xenon (APD Bias Control)            |                 |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:    | No Revisions    |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls                        | DOCUMENT NUMBER |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007                            | XEL0182         |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01                            |                 |
|  |  | REV.            |






Channel29

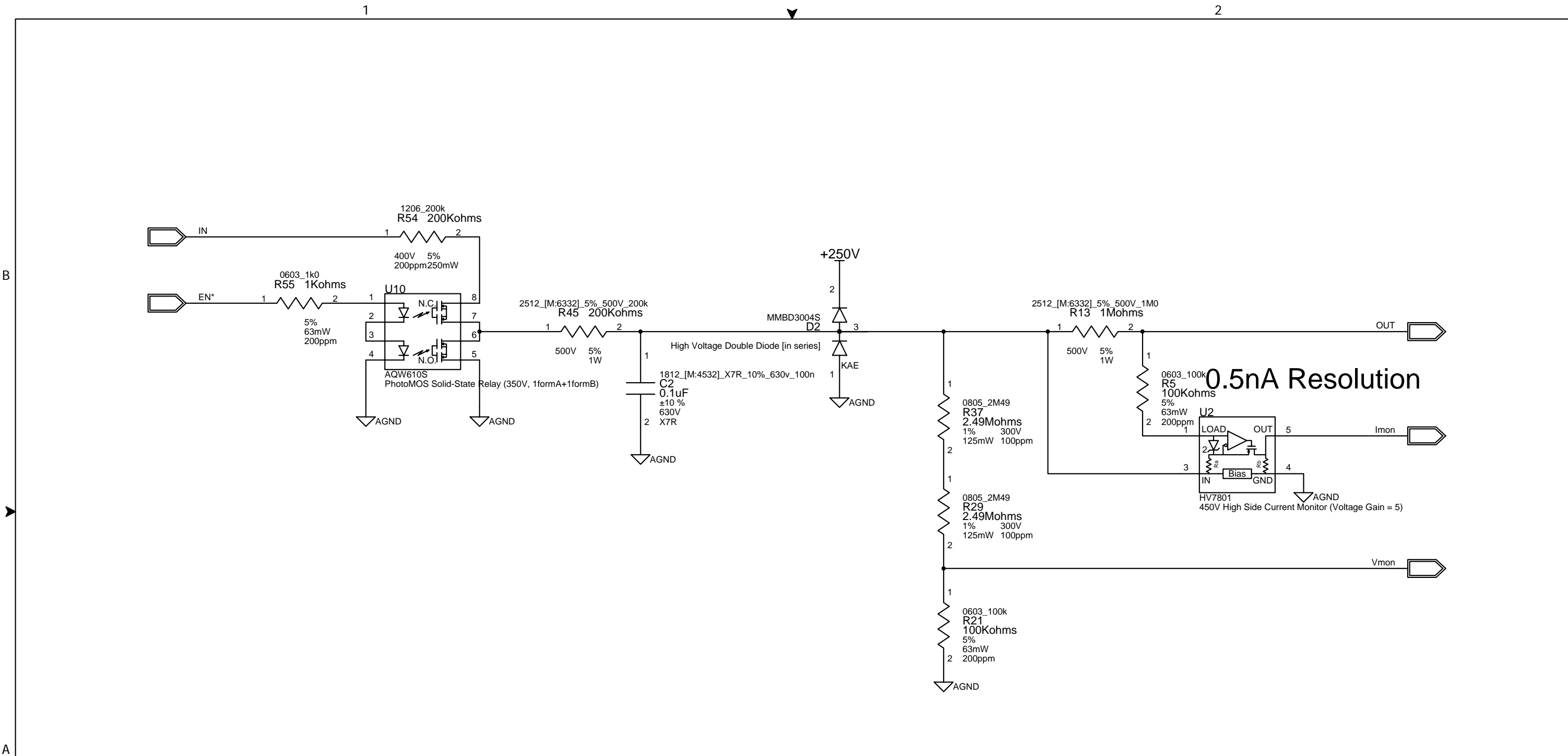
|  |  |   |      |
|--|--|---|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> |  | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |  | REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions  |      |
| PROJECT: Liquid Xenon  |  | DOCUMENT NUMBER   |      |
| DESIGNED: Chris Ohlmann  |  | LIST: LXe_IVC32.xls   | REV. |
| DRAWN: Chris Ohlmann   |  | DATE: 3/14/2007   |      |
| CHECKED: L. Kurchaninov  |  | SHEET: 01 OF 01   |      |
| APPROVED: L. Kurchaninov   |  | XEL0182   |      |




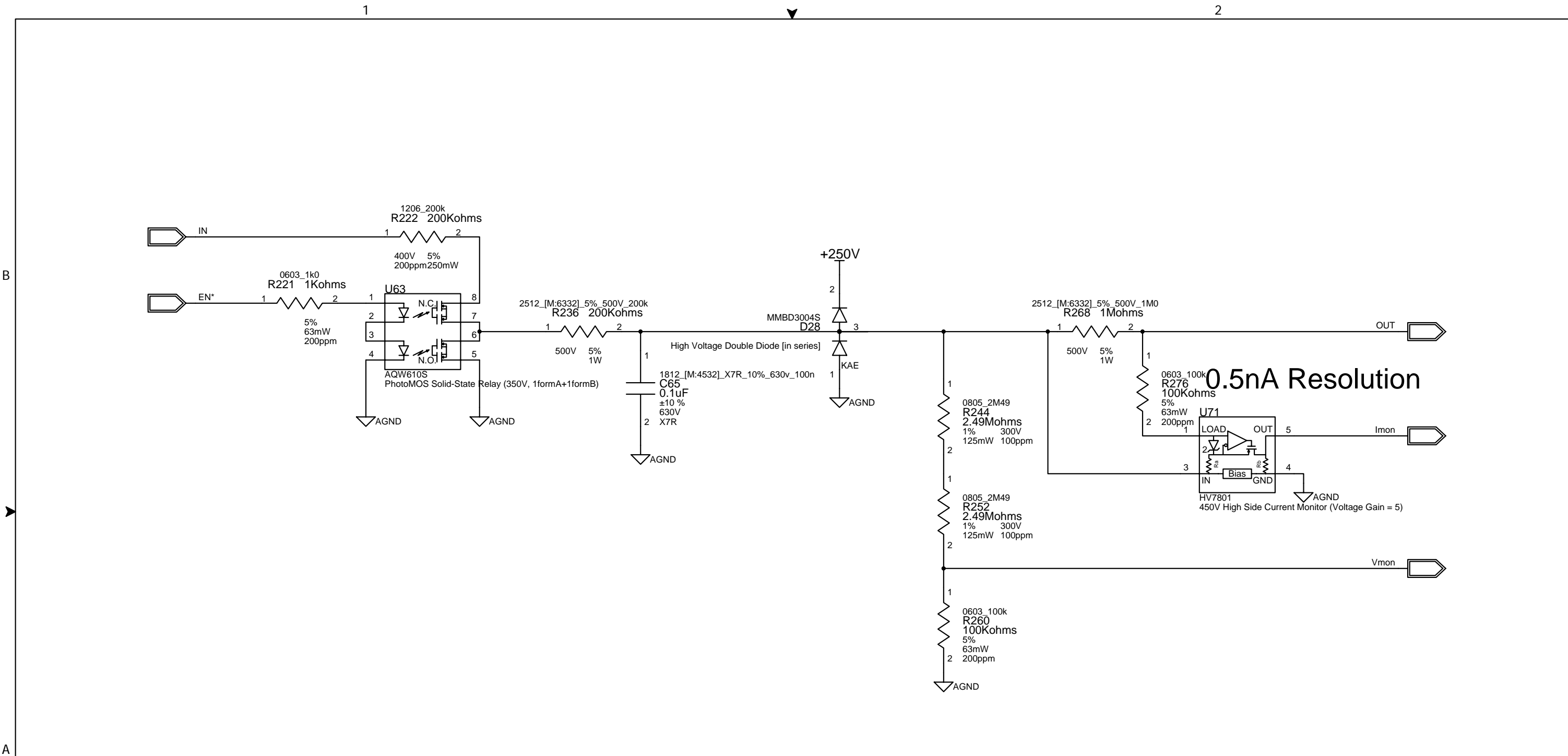
Channel28

|  |  |                 |
|--|--|-----------------|
| <div><div></div><div><div>Canada's National Laboratory for Particle and Nuclear Physics</div><div>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3</div><div>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div></div></div> | Output Channel Block Schematic             |                 |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   | 32-Channel Intermediate Voltage Controller |                 |
| PROJECT: Liquid Xenon  | Liquid Xenon (APD Bias Control)            |                 |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:    | No Revisions    |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls                        | DOCUMENT NUMBER |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007                            | XEL0182         |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01                            |                 |
|  |  | REV.            |




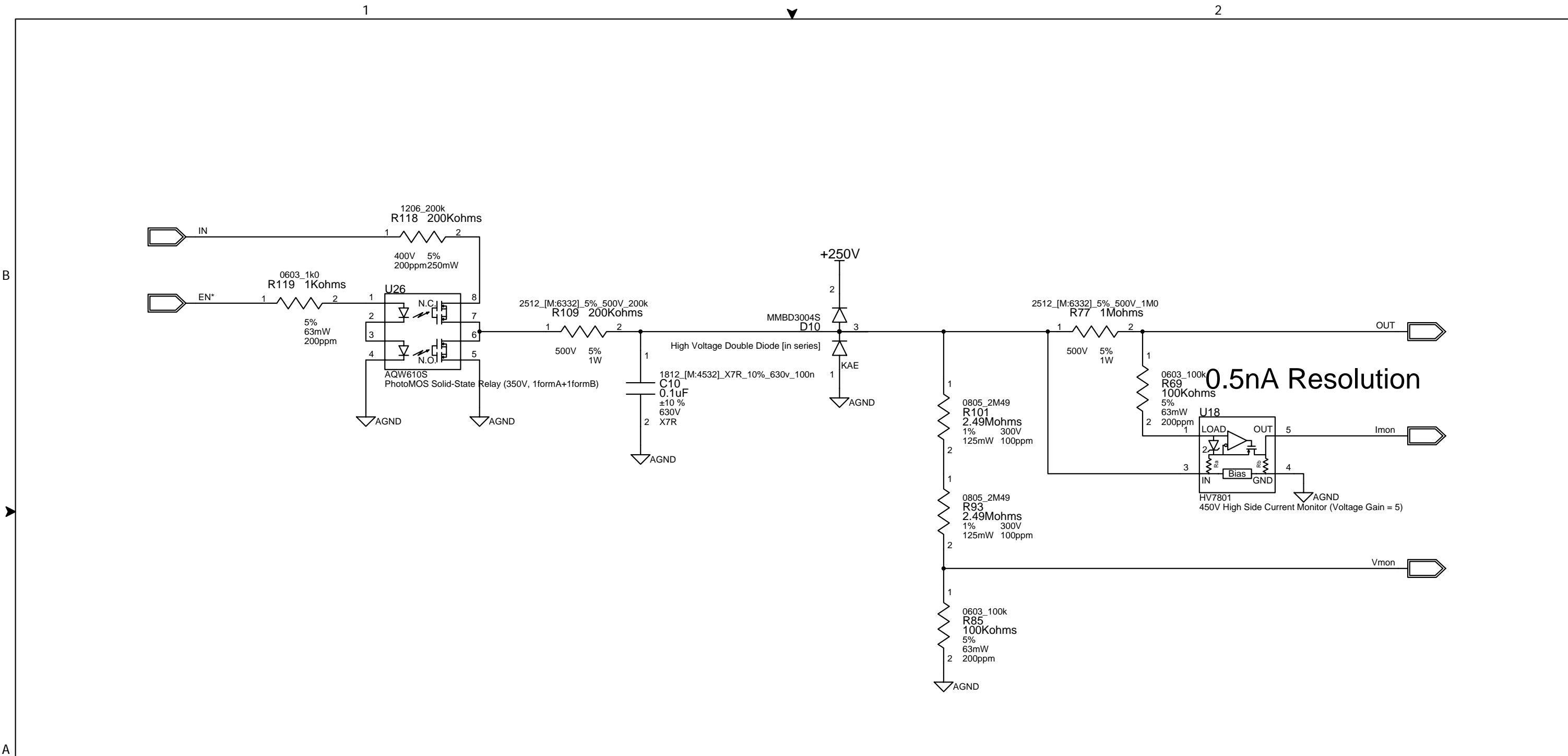


|  |  |  |      |
|--|--|--|------|
|  <b>TRIUMF</b><br>Canada's National Laboratory for Particle and Nuclear Physics<br>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074 |  | <b>Output Channel Block Schematic</b><br><b>32-Channel Intermediate Voltage Controller</b><br><b>Liquid Xenon (APD Bias Control)</b> |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |  | REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions   |      |
| PROJECT: Liquid Xenon  |  | DOCUMENT NUMBER  |      |
| DESIGNED: Chris Ohlmann  |  | LIST: LXe_IVC32.xls  | REV. |
| DRAWN: Chris Ohlmann   |  | DATE: 3/14/2007  |      |
| CHECKED: L. Kurchaninov  |  | SHEET: 01 OF 01  |      |
| APPROVED: L. Kurchaninov   |  | <b>XEL0182</b>   |      |




Channel26

|  |  |
|--|--|
| <div><div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div></div> | <div>Output Channel Block Schematic</div> <div>32-Channel Intermediate Voltage Controller</div> <div>Liquid Xenon (APD Bias Control)</div> |
| PROJECT: Liquid Xenon  | REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions   |
| DESIGNED: Chris Ohlmann  | LIST: LXe_IVC32.xls  |
| DRAWN: Chris Ohlmann   | DATE: 3/14/2007  |
| CHECKED: L. Kurchaninov  | DOCUMENT NUMBER  |
| APPROVED: L. Kurchaninov   | XEL0182  |
|  | REV.   |
|  | SHEET: 01 OF 01  |

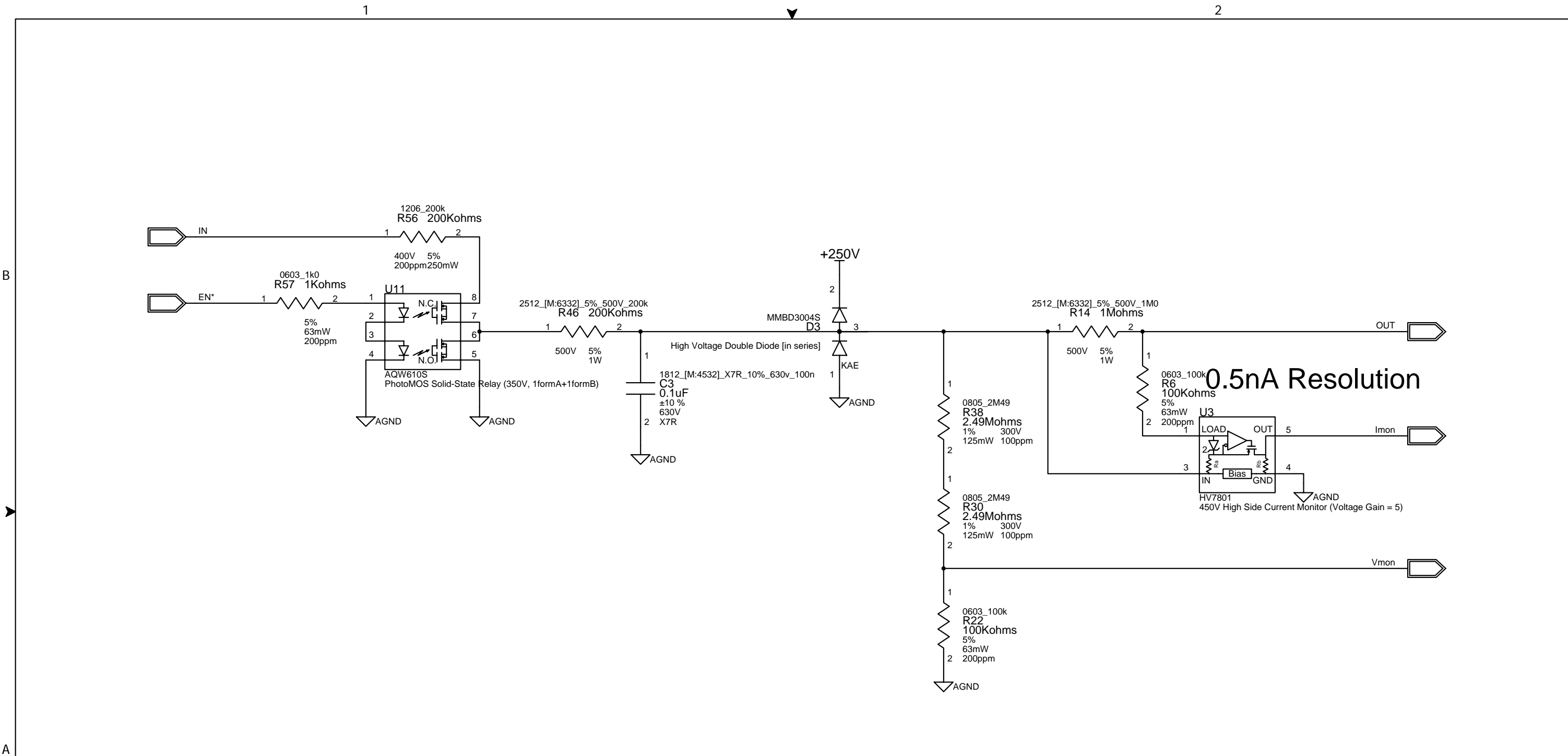



0.5nA Resolution

Channel25

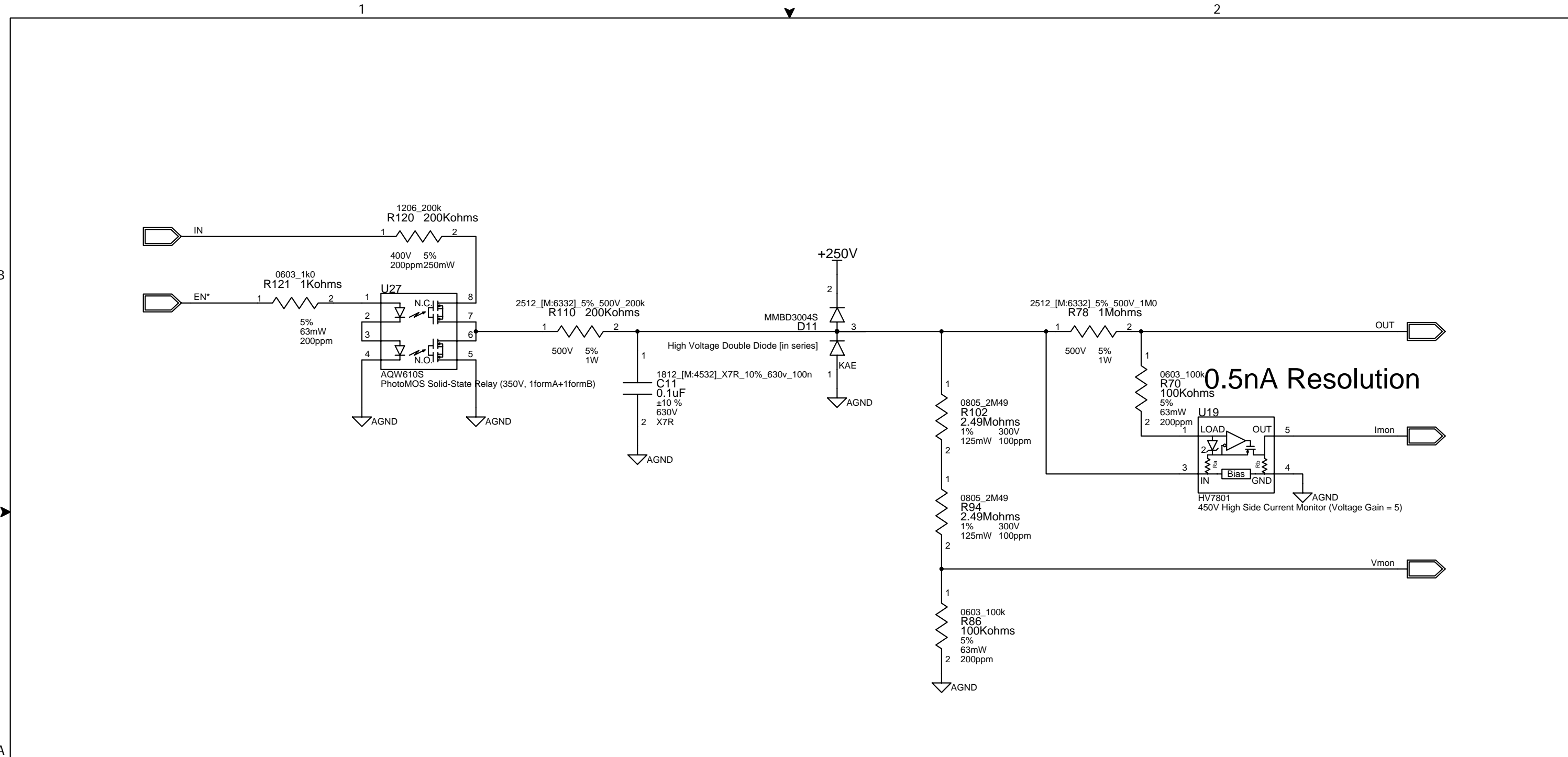
|  |   |  |
|--|---|--|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |  |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   | REVISIONS ARE DETAILED IN THE DOCUMENT:   |  |
| PROJECT: Liquid Xenon  | No Revisions  |  |
| DESIGNED: Chris Ohlmann  | LIST: LXe_IVC32.xls   |  |
| DRAWN: Chris Ohlmann   | DATE: 3/14/2007   |  |
| CHECKED: L. Kurchaninov  | DOCUMENT NUMBER   |  |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01   |  |
|  | XEL0182   |  |
|  | REV.  |  |






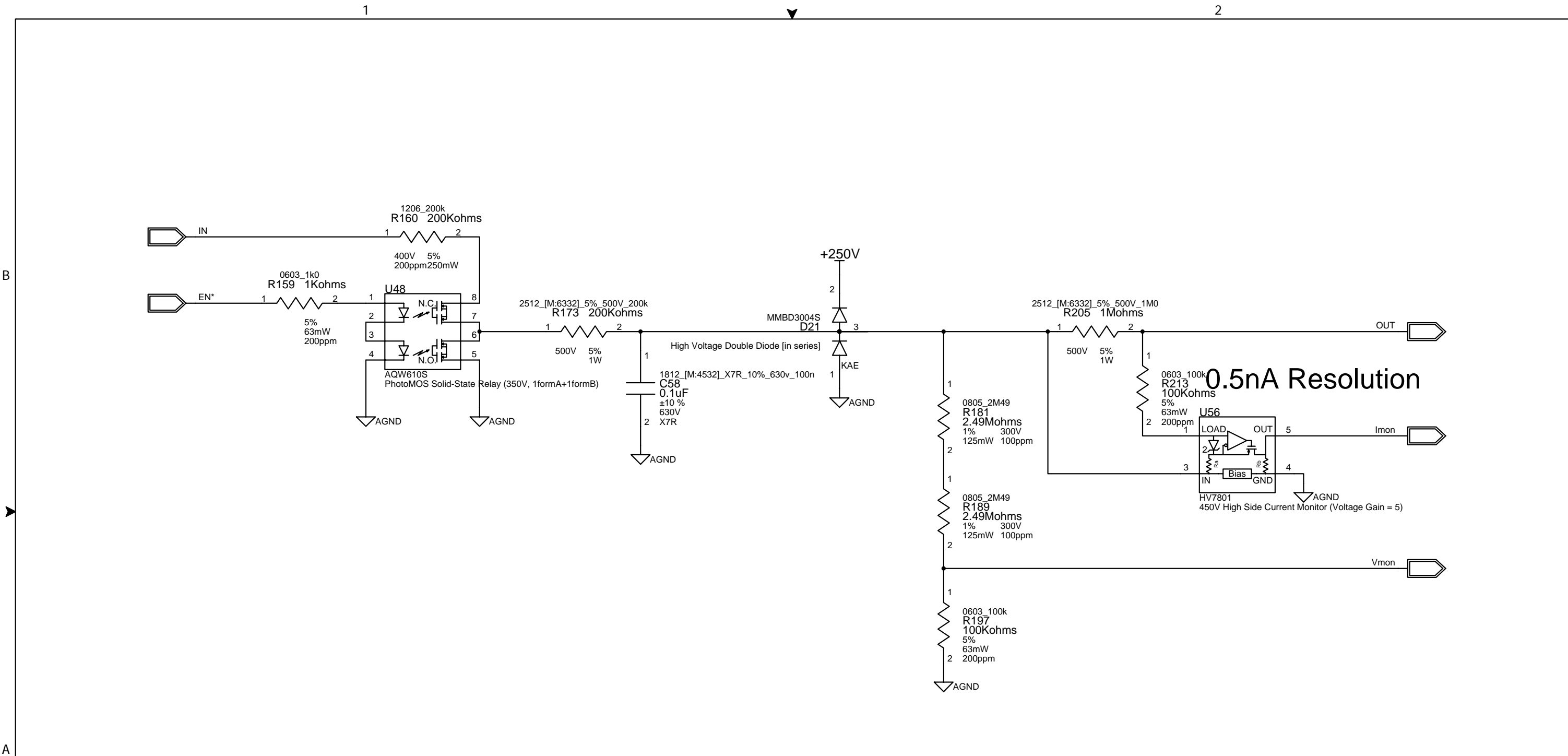
|  |   |   |  |
|--|---|---|--|
| <div><div></div><div><div>Canada's National Laboratory for Particle and Nuclear Physics</div><div>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3</div><div>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div></div></div> | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |   |  |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |   | REVISIONS ARE DETAILED IN THE DOCUMENT: |  |
| PROJECT: Liquid Xenon  |   | No Revisions                            |  |
| DESIGNED: Chris Ohlmann  |   | LIST: LXe_IVC32.xls                     |  |
| DRAWN: Chris Ohlmann   |   | DATE: 3/14/2007                         |  |
| CHECKED: L. Kurchaninov  |   | DOCUMENT NUMBER                         |  |
| APPROVED: L. Kurchaninov   |   | XEL0182                                 |  |
|  |   | REV.                                    |  |
|  |   |   |  |






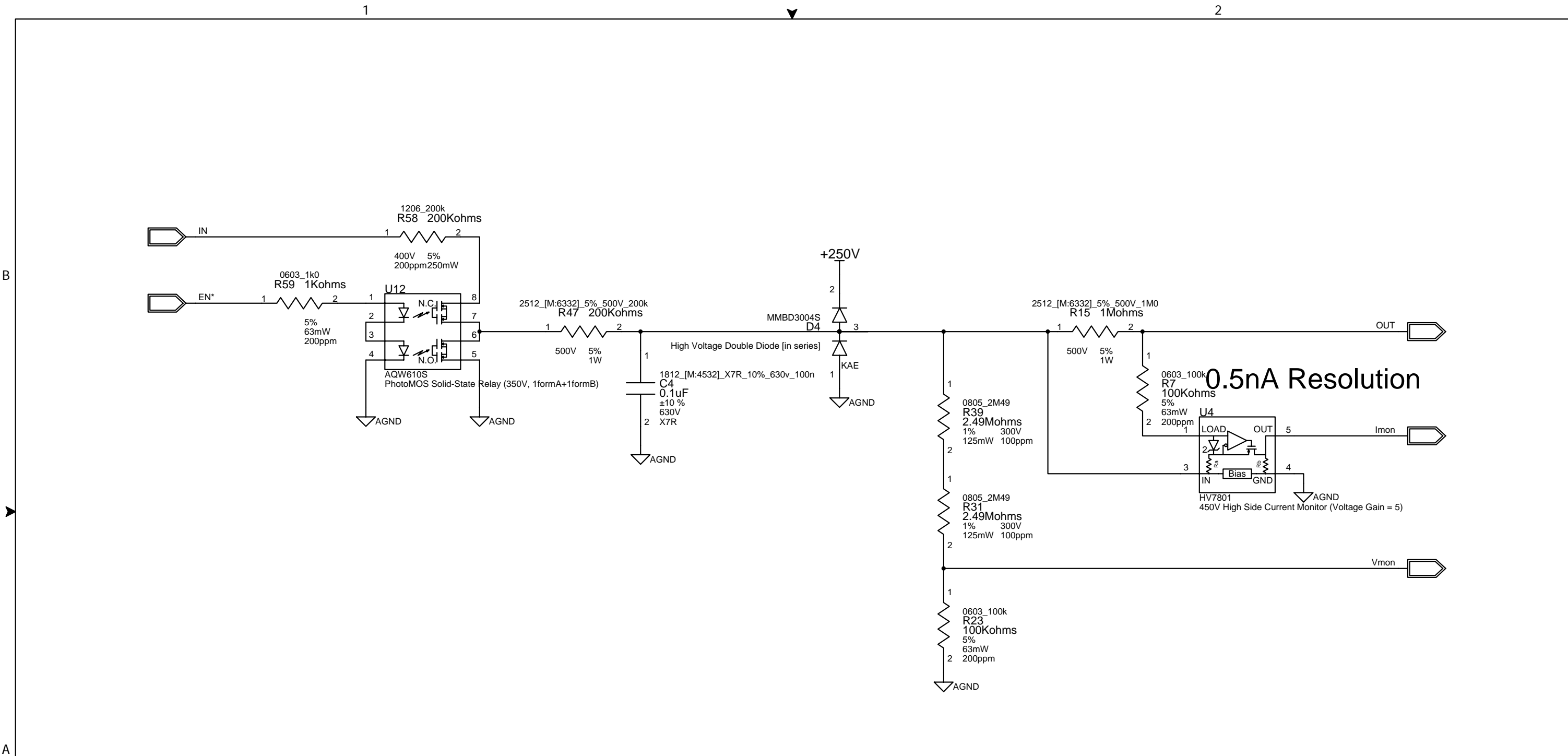
Channel21

|  |  |   |      |
|--|--|---|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> |  | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |  | REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions  |      |
| PROJECT: Liquid Xenon  |  | DOCUMENT NUMBER   |      |
| DESIGNED: Chris Ohlmann  |  | LIST: LXe_IVC32.xls   | REV. |
| DRAWN: Chris Ohlmann   |  | DATE: 3/14/2007   |      |
| CHECKED: L. Kurchaninov  |  | SHEET: 01 OF 01   |      |
| APPROVED: L. Kurchaninov   |  | XEL0182   |      |




|  |   |                 |      |
|--|---|-----------------|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |                 |      |
|  | THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS<br>PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.               |                 |      |
|  | PROJECT: Liquid Xenon   |                 |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:   | No Revisions    |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls   | DOCUMENT NUMBER | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007   | XEL0182         | —    |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01   |                 |      |

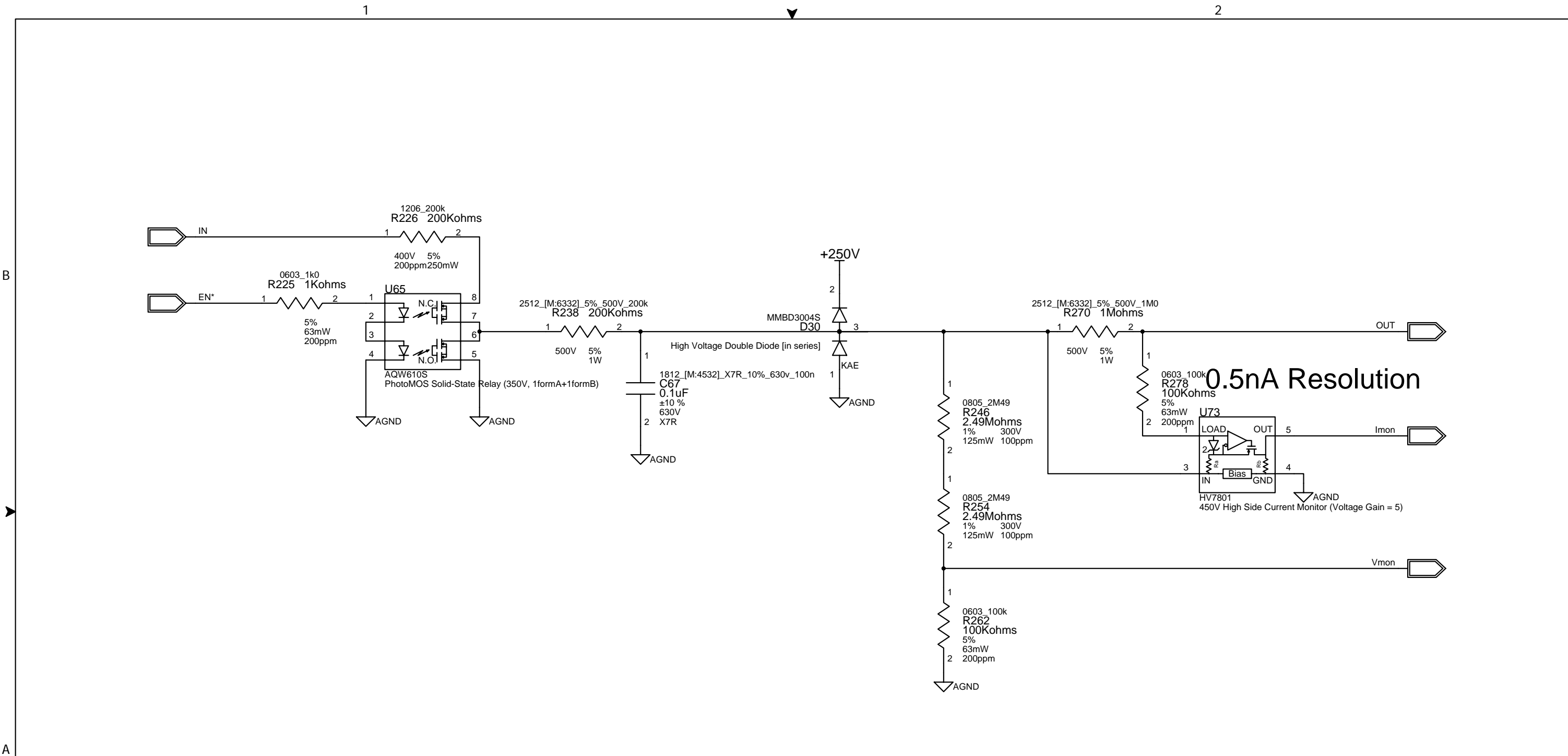





0.5nA Resolution

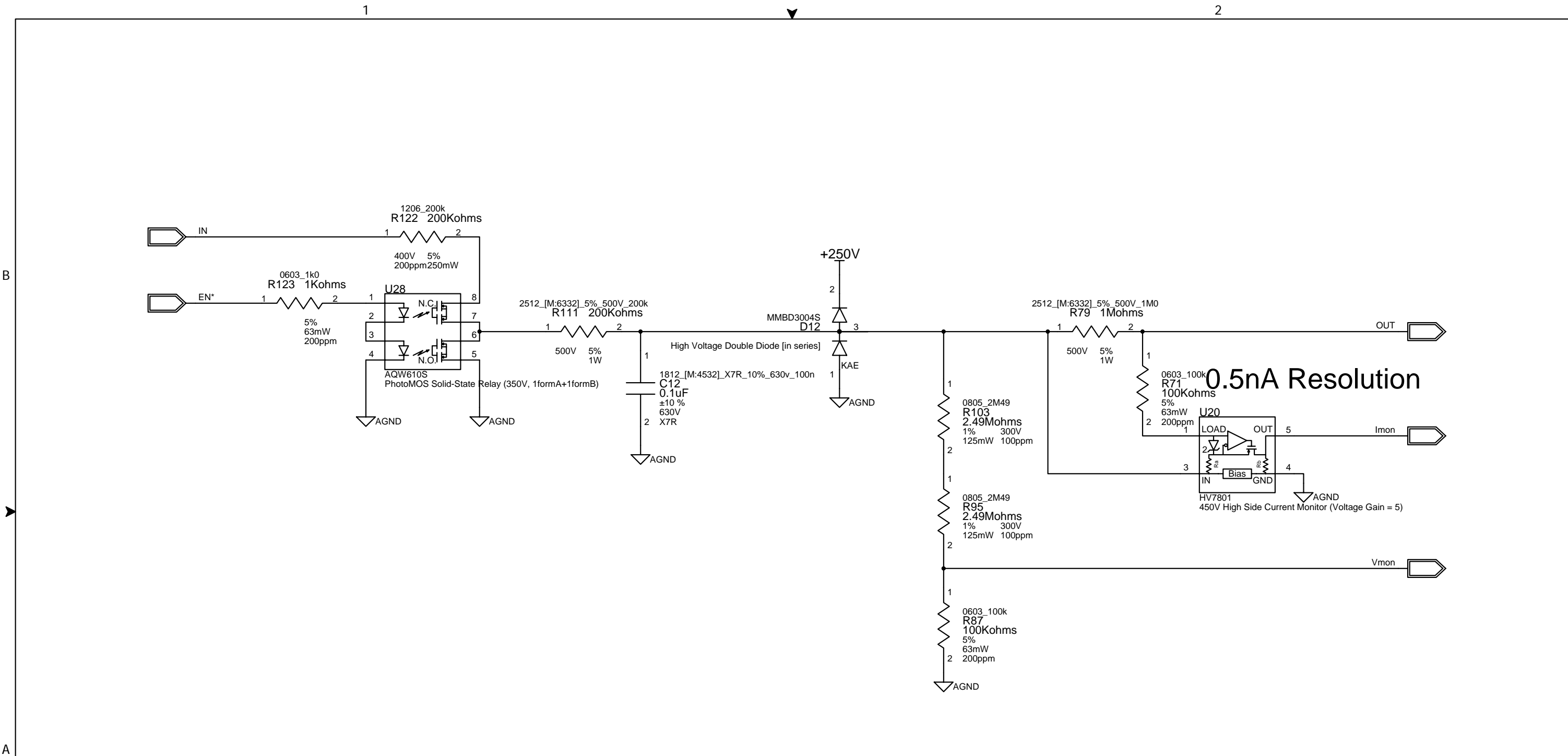
Channel19

|  |   |  |
|--|---|--|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |  |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   | REVISIONS ARE DETAILED IN THE DOCUMENT:   |  |
| PROJECT: Liquid Xenon  | No Revisions  |  |
| DESIGNED: Chris Ohlmann  | LIST: LXe_IVC32.xls   |  |
| DRAWN: Chris Ohlmann   | DATE: 3/14/2007   |  |
| CHECKED: L. Kurchaninov  | DOCUMENT NUMBER   |  |
| APPROVED: L. Kurchaninov   | XEL0182   |  |
|  | REV.  |  |
|  | SHEET: 01 OF 01   |  |




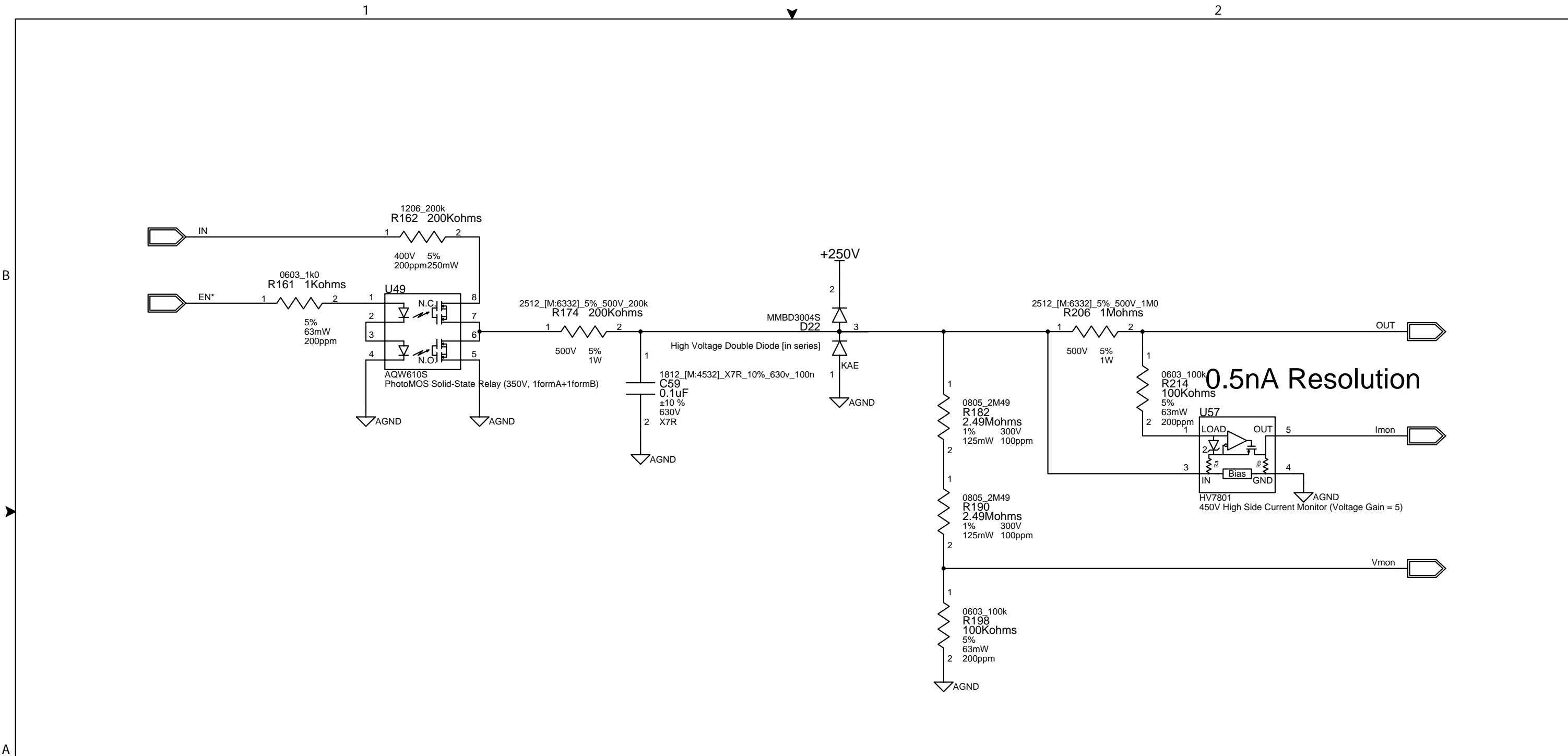
Channel18

|  |  |
|--|--|
| <div><div></div><div><div>Canada's National Laboratory for Particle and Nuclear Physics</div><div>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3</div><div>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div></div></div> | <div>Output Channel Block Schematic</div> <div>32-Channel Intermediate Voltage Controller</div> <div>Liquid Xenon (APD Bias Control)</div> |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   | REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions   |
| PROJECT: Liquid Xenon  | LIST: LXe_IVC32.xls  |
| DESIGNED: Chris Ohlmann  | DATE: 3/14/2007  |
| DRAWN: Chris Ohlmann   | DOCUMENT NUMBER  |
| CHECKED: L. Kurchaninov  | XEL0182  |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01  |
|  | REV.   |




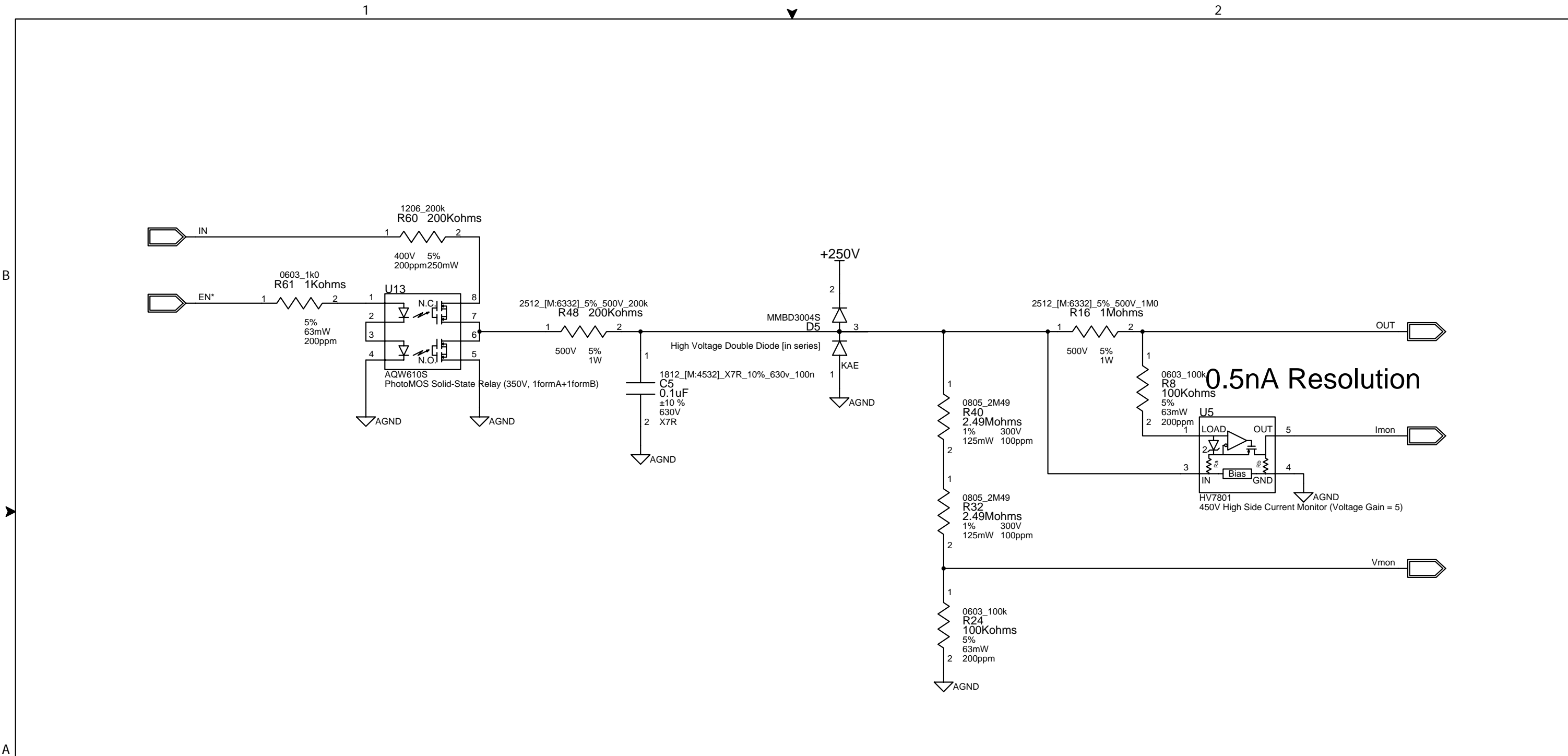
Channel17

|  |   |  |      |
|--|---|--|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> |   | Output Channel Block Schematic             |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |   | 32-Channel Intermediate Voltage Controller |      |
| PROJECT: Liquid Xenon  |   | Liquid Xenon (APD Bias Control)            |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT: | No Revisions                               |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls                     | DOCUMENT NUMBER                            | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007                         | XEL0182                                    |      |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01                         |  |      |




Channel16

|  |  |                 |      |
|--|--|-----------------|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic             |                 |      |
|  | 32-Channel Intermediate Voltage Controller |                 |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS<br>PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.  | Liquid Xenon (APD Bias Control)            |                 |      |
| PROJECT: Liquid Xenon  |  |                 |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:    | No Revisions    |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls                        | DOCUMENT NUMBER | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007                            | XEL0182         | _    |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01                            |                 |      |



0.5nA Resolution

Channel15

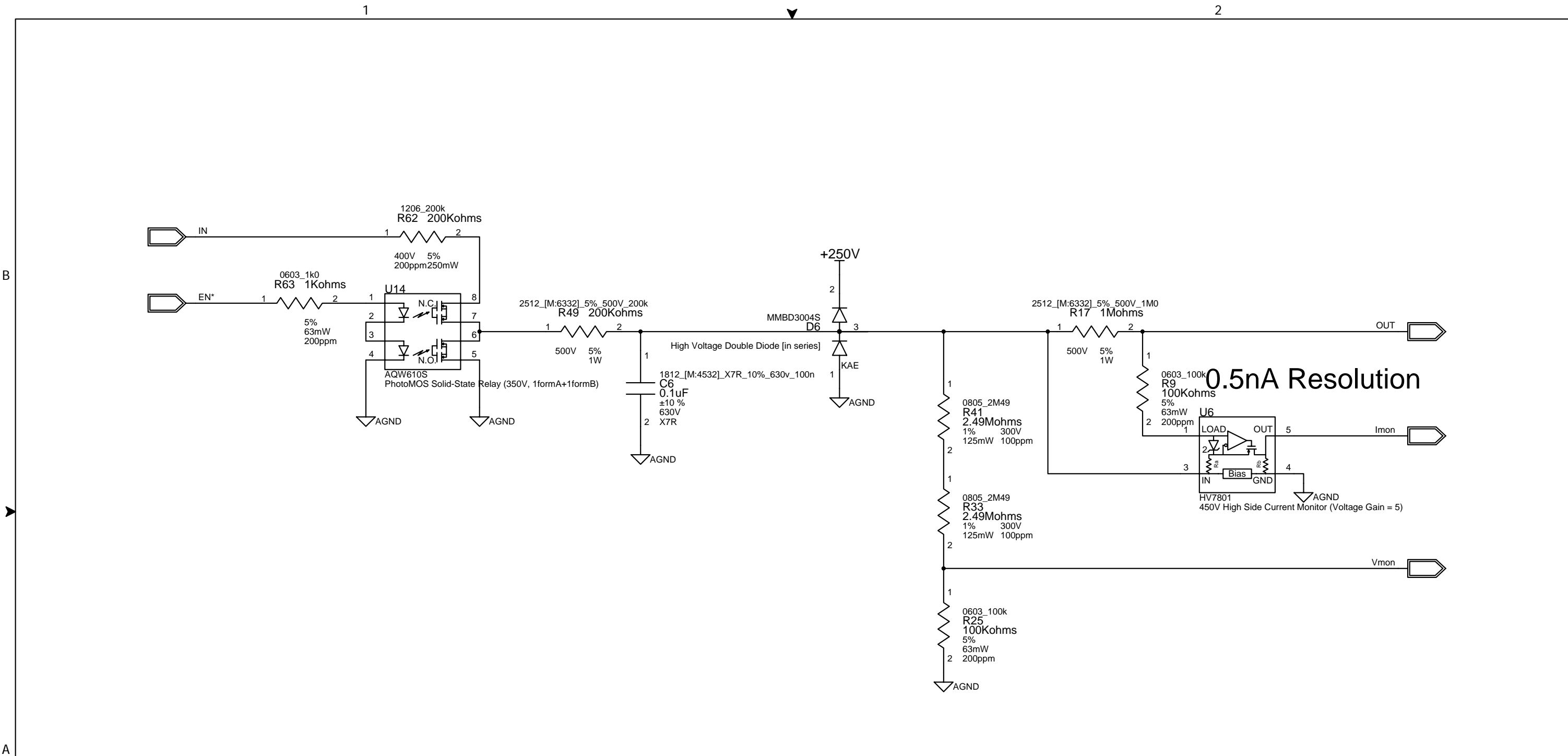
|  |  |                 |      |
|--|--|-----------------|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic             |                 |      |
|  | 32-Channel Intermediate Voltage Controller |                 |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   | Liquid Xenon (APD Bias Control)            |                 |      |
| PROJECT: Liquid Xenon  |  |                 |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:    | No Revisions    |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls                        | DOCUMENT NUMBER | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007                            | XEL0182         | _    |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01                            |                 |      |











**TRIUMF**  
Canada's National Laboratory for Particle and Nuclear Physics  
4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3  
Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074

THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.

PROJECT: Liquid Xenon

DESIGNED: Chris Ohlmann

DRAWN: Chris Ohlmann

CHECKED: L. Kurchaninov

APPROVED: L. Kurchaninov

# Output Channel Block Schematic 32-Channel Intermediate Voltage Controller Liquid Xenon (APD Bias Control)

REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions

LIST: LXe\_IVC32.xls

DATE: 3/14/2007

SHEET: 01 OF 01

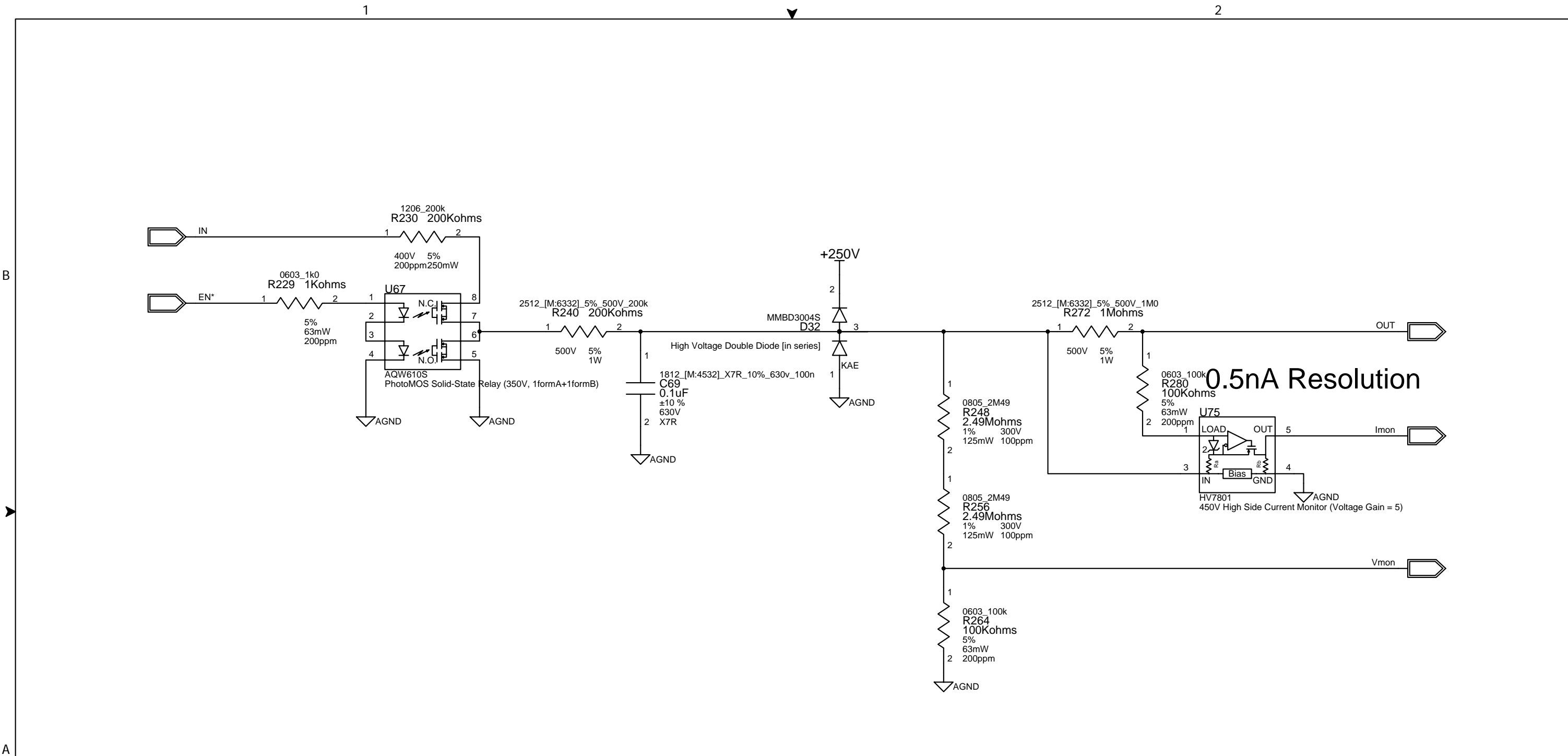
DOCUMENT NUMBER

**XEL0182**


REV.

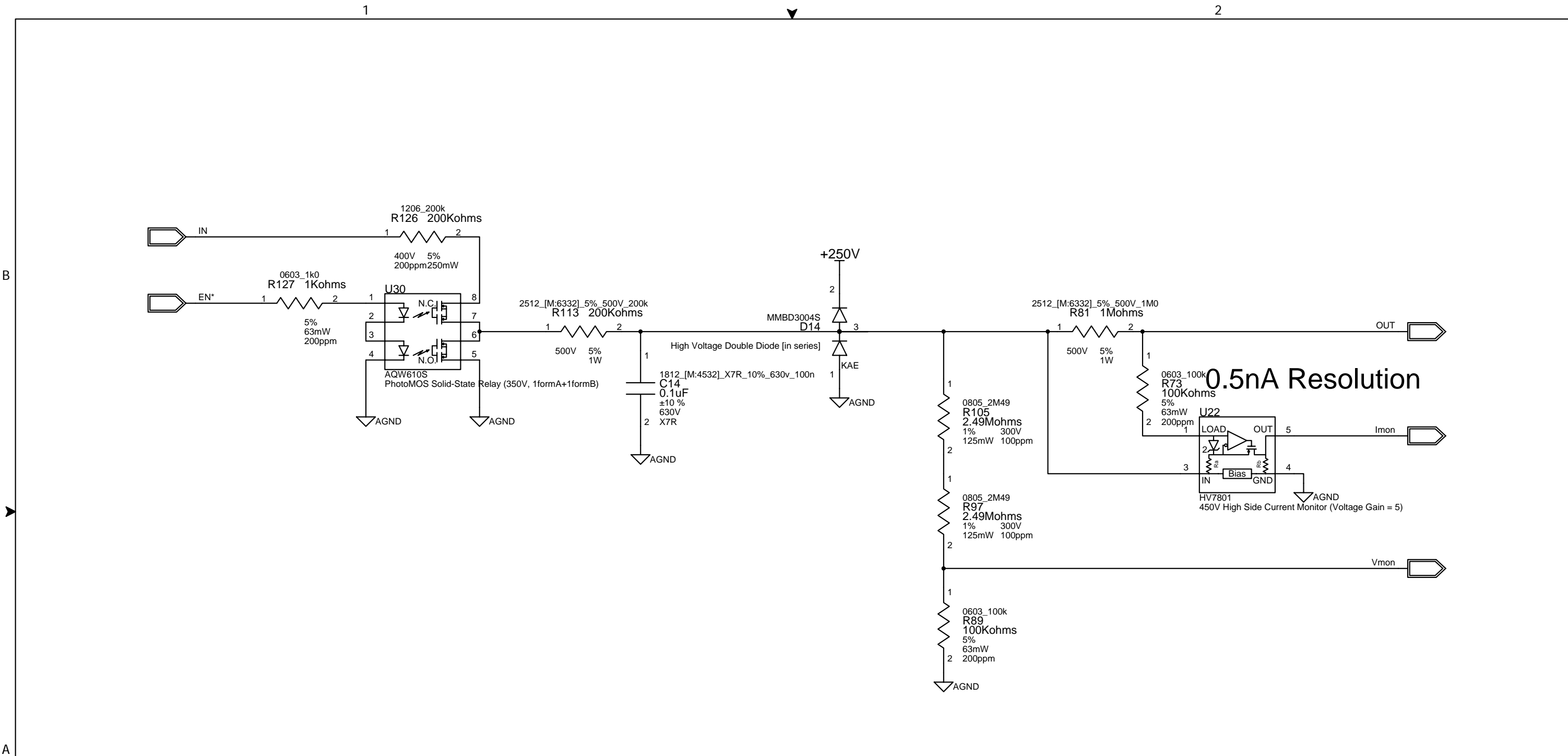
—

Last Modified at: 12:22:44 PM on 3/14/2007  
Current Library Name: M:\ms\_electronics\mentor\libraries\MS\_Elx\_CL\MS\_Elx\_CL.lmc  
PCB File Name: @PCBFileName




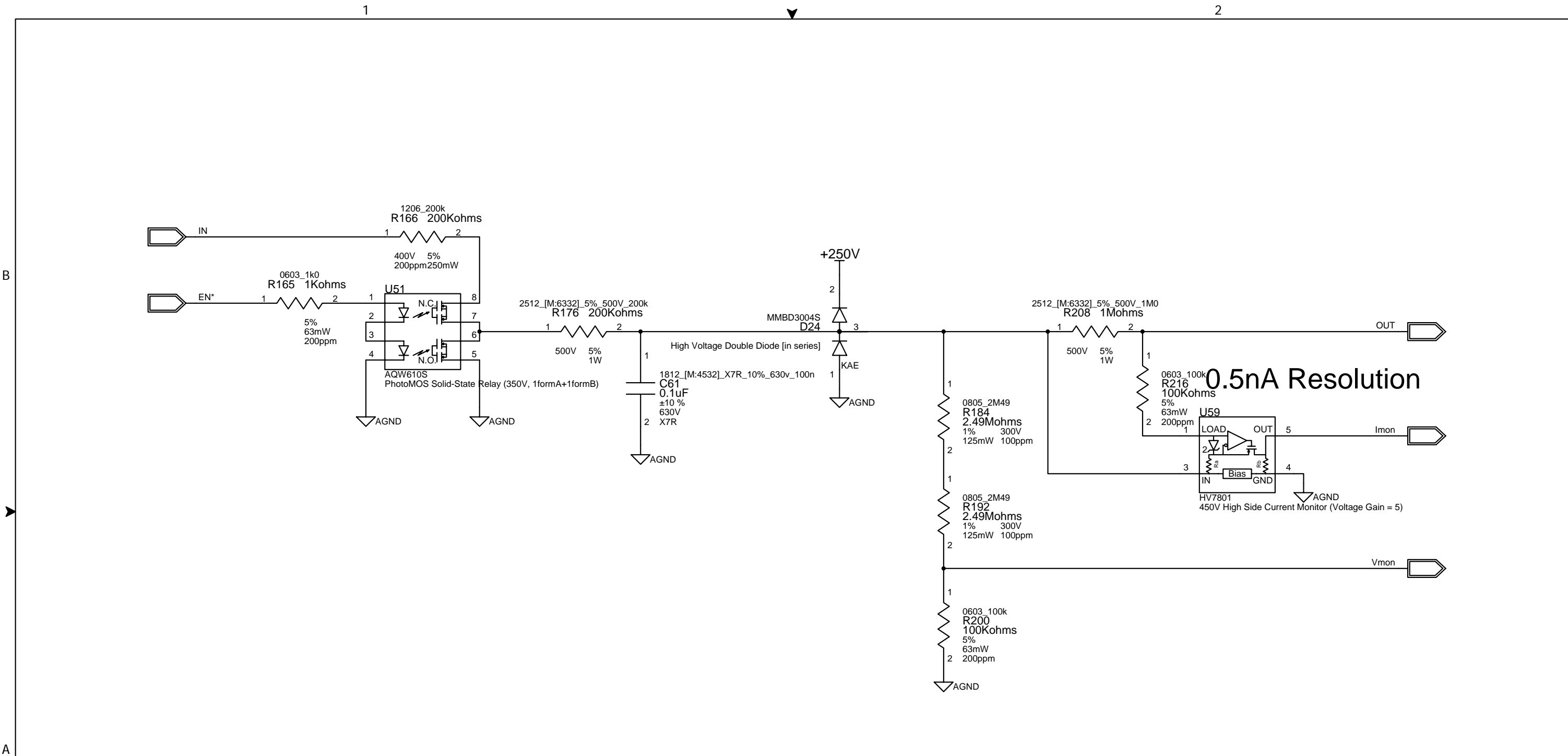
Channel10

|  |   |  |              |
|--|---|--|--------------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> |   | Output Channel Block Schematic             |              |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |   | 32-Channel Intermediate Voltage Controller |              |
| PROJECT: Liquid Xenon  |   | Liquid Xenon (APD Bias Control)            |              |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT: |  | No Revisions |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls                     | DOCUMENT NUMBER                            |              |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007                         | XEL0182                                    |              |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01                         |  |              |
|  |   |  | REV. _____   |




Channel9

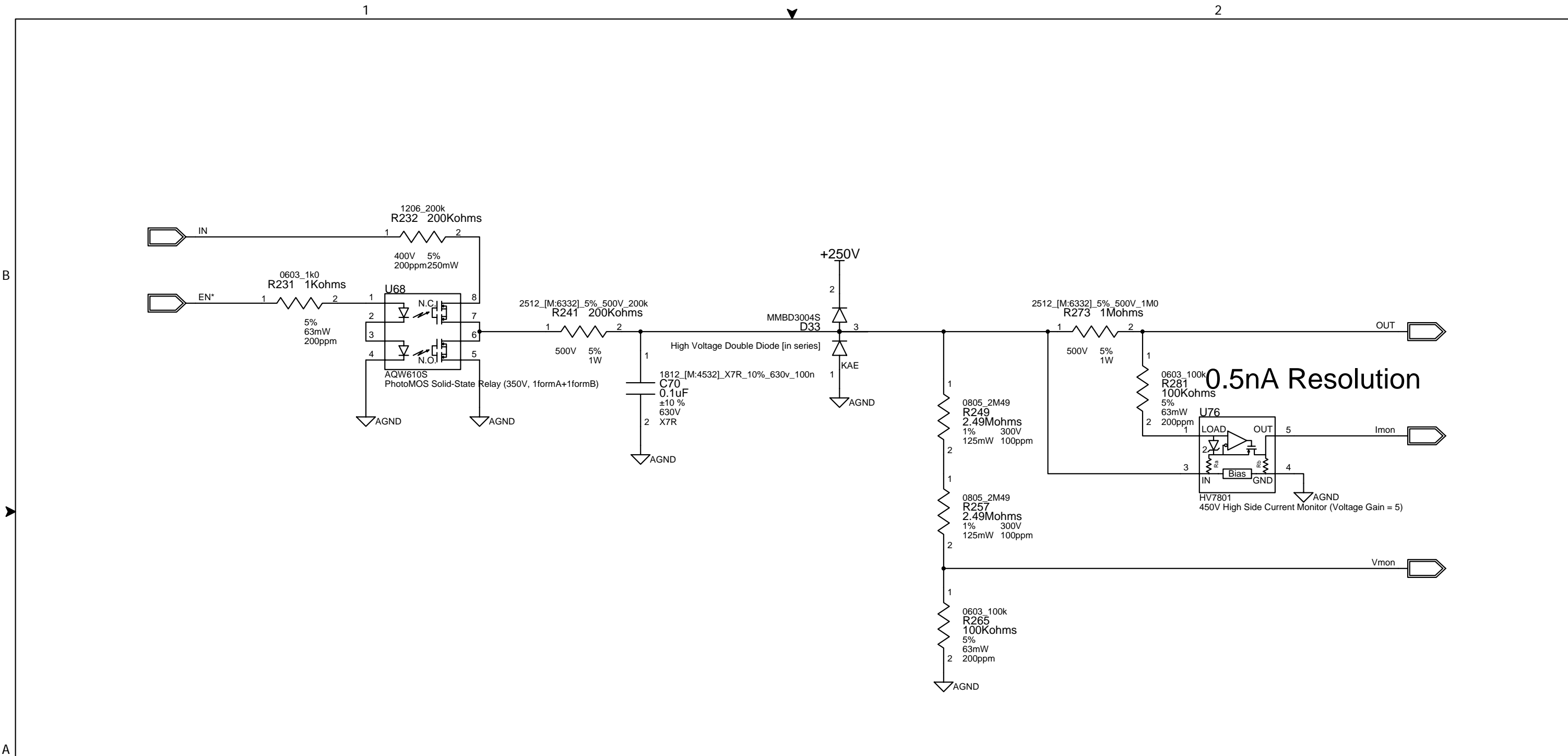
|  |  |   |      |
|--|--|---|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> |  | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |  | REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions  |      |
| PROJECT: Liquid Xenon  |  | DOCUMENT NUMBER   |      |
| DESIGNED: Chris Ohlmann  |  | LIST: LXe_IVC32.xls   | REV. |
| DRAWN: Chris Ohlmann   |  | DATE: 3/14/2007   |      |
| CHECKED: L. Kurchaninov  |  | SHEET: 01 OF 01   |      |
| APPROVED: L. Kurchaninov   |  | XEL0182   |      |




Channel8

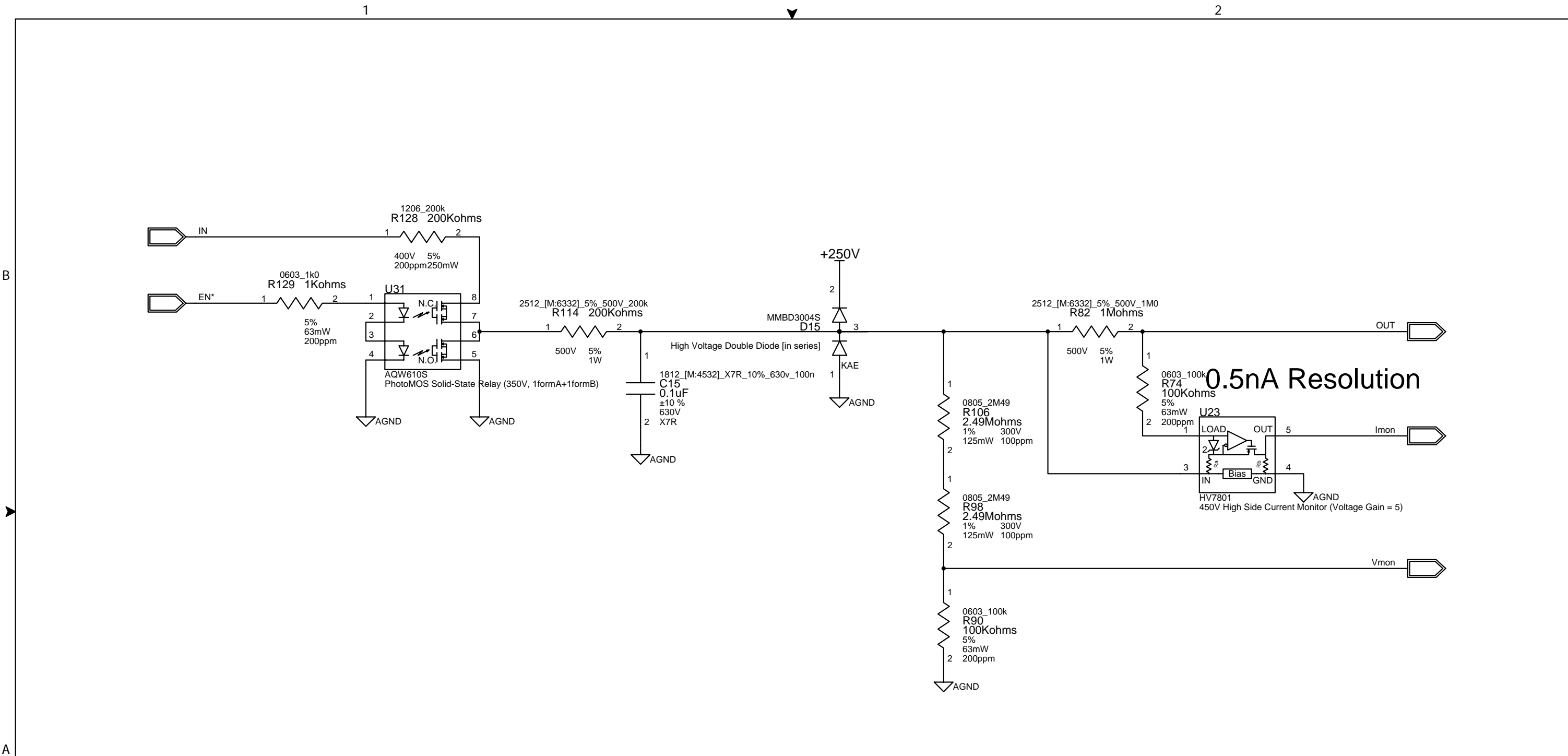
|  |   |                 |      |
|--|---|-----------------|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |                 |      |
|  | THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS<br>PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.               |                 |      |
| PROJECT: Liquid Xenon  |   |                 |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:   | No Revisions    |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls   | DOCUMENT NUMBER | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007   | XEL0182         | —    |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01   |                 |      |






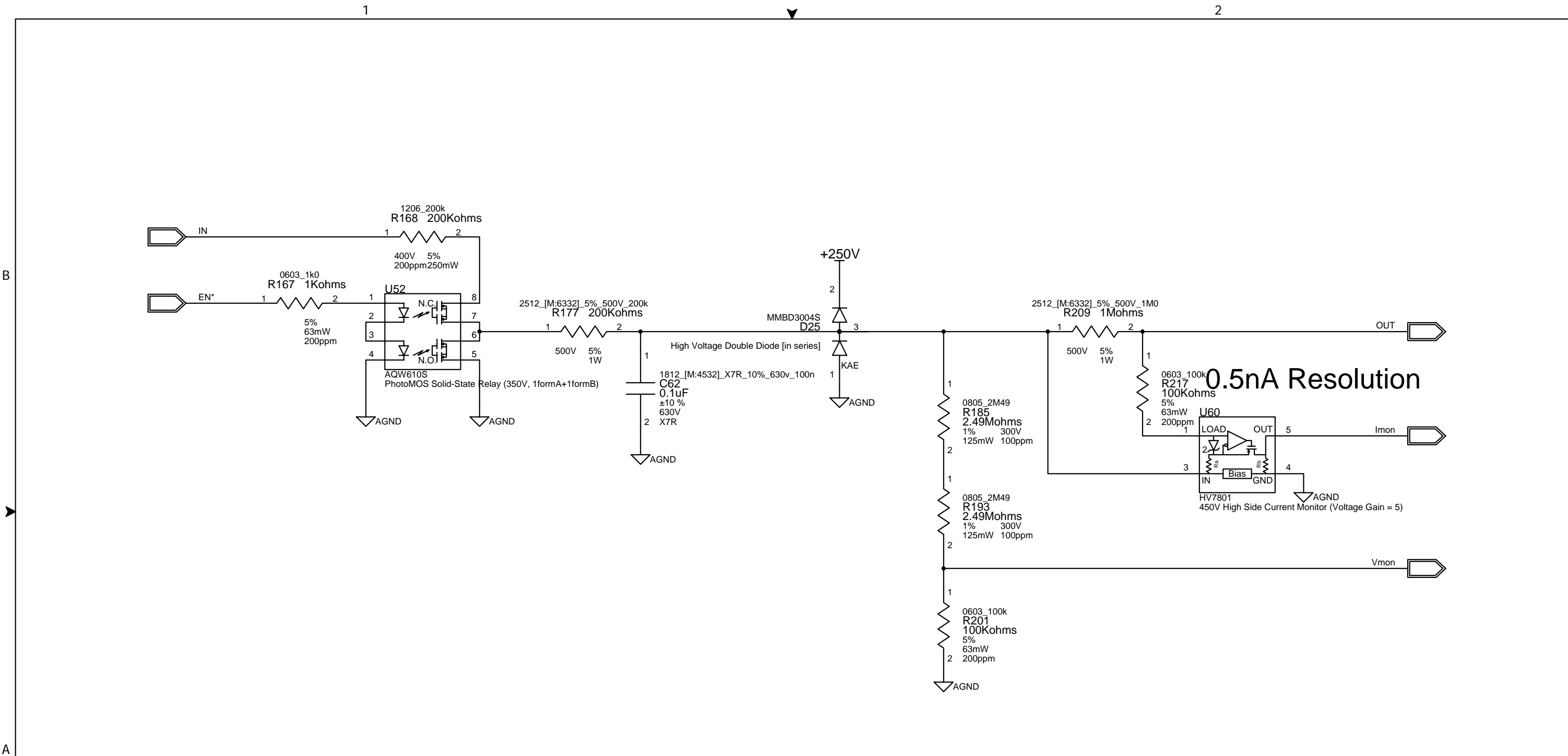
|  |  |   |  |                                   |               |
|--|--|---|--|-----------------------------------|---------------|
| <div><div><div><div>TRIUMF</div><div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div></div></div><div>THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS<br/>PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.</div></div> |  | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |  |                                   |               |
| PROJECT: Liquid Xenon  |  | REVISIONS ARE DETAILED IN THE DOCUMENT:   |  | No Revisions                      |               |
| DESIGNED: Chris Ohlmann  |  | LIST: LXe_IVC32.xls   |  | DOCUMENT NUMBER<br><b>XEL0182</b> | REV.<br><br>_ |
| DRAWN: Chris Ohlmann   |  | DATE: 3/14/2007   |  |                                   |               |
| CHECKED: L. Kurchaninov  |  | SHEET: 01 OF 01   |  |                                   |               |
| APPROVED: L. Kurchaninov   |  |   |  |                                   |               |

Last Modified at: 12:22:44 PM on 3/14/2007  
Last Modified by: Chris Ohlmann  
PCB File Name: @PCBFileName




Channel5

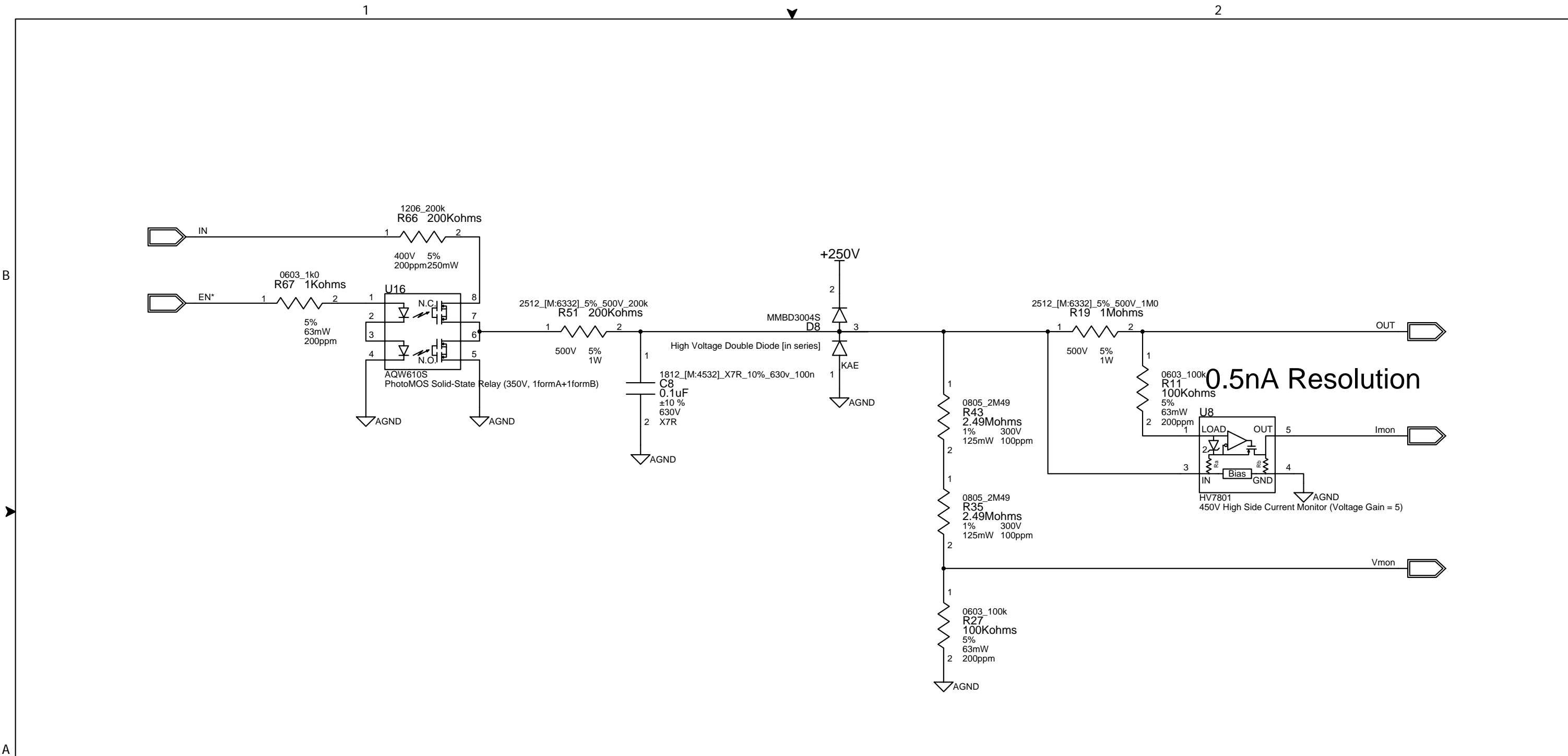
|  |  |                 |      |
|--|--|-----------------|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic             |                 |      |
|  | 32-Channel Intermediate Voltage Controller |                 |      |
|  | Liquid Xenon (APD Bias Control)            |                 |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |  |                 |      |
| PROJECT: Liquid Xenon  |  |                 |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:    | No Revisions    |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls                        | DOCUMENT NUMBER | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007                            | XEL0182         | —    |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01                            |                 |      |




Channel4

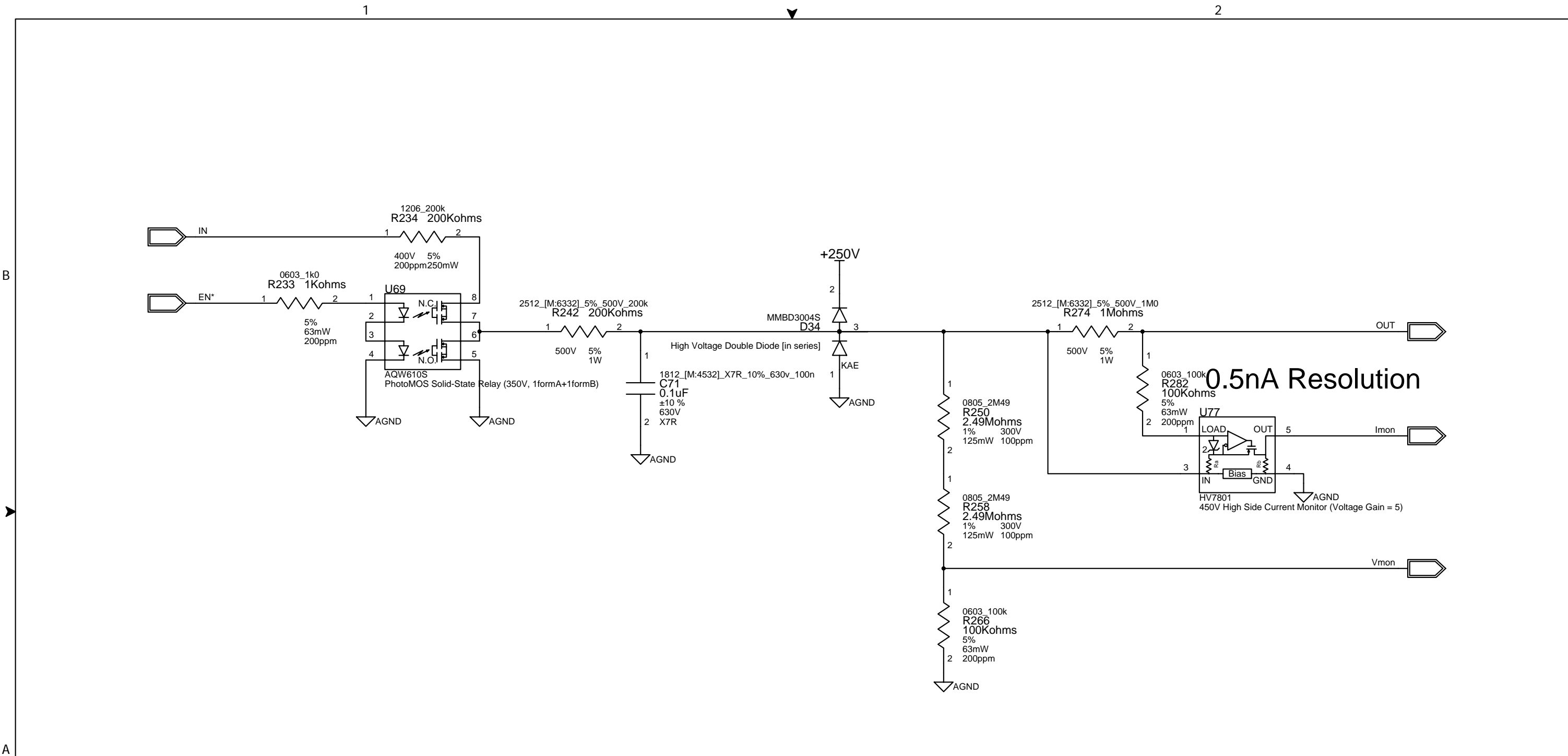
|  |   |                 |      |
|--|---|-----------------|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |                 |      |
|  | THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS<br>PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.               |                 |      |
|  | PROJECT: Liquid Xenon   |                 |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:   | No Revisions    |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls   | DOCUMENT NUMBER | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007   | XEL0182         | —    |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01   |                 |      |




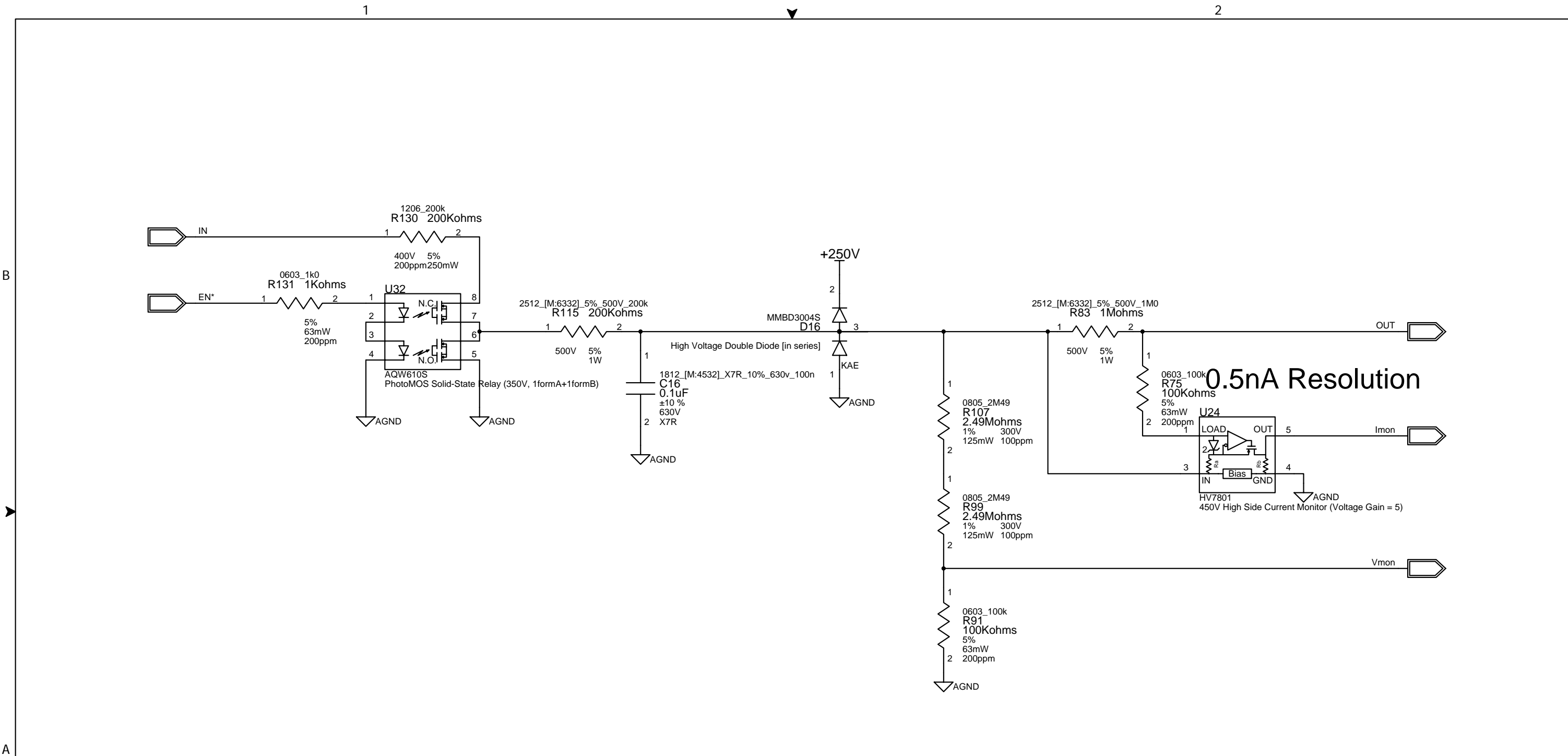


Channel3


|  |   |                 |      |
|--|---|-----------------|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |                 |      |
|  | THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS<br>PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.               |                 |      |
| PROJECT: Liquid Xenon  |   |                 |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:   | No Revisions    |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls   | DOCUMENT NUMBER | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007   | XEL0182         | —    |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01   |                 |      |

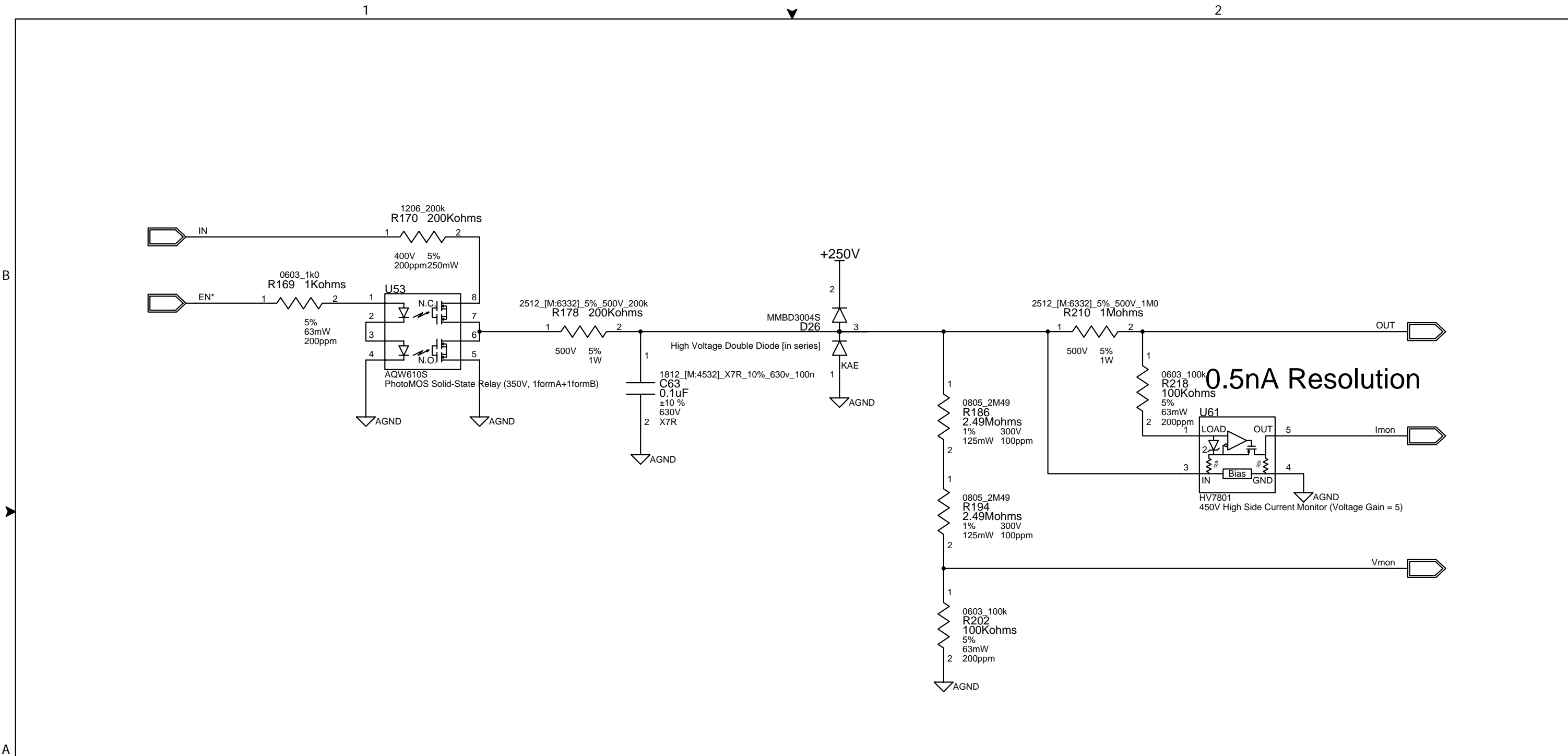


|  |  |   |  |
|--|--|---|--|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> |  | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |  |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   |  | REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions  |  |
| PROJECT: Liquid Xenon  |  | LIST: LXe_IVC32.xls   |  |
| DESIGNED: Chris Ohlmann  |  | DATE: 3/14/2007   |  |
| DRAWN: Chris Ohlmann   |  | DOCUMENT NUMBER   |  |
| CHECKED: L. Kurchaninov  |  | XEL0182   |  |
| APPROVED: L. Kurchaninov   |  | REV.  |  |
|  |  |   |  |




Channel1

|  |  |                 |      |
|--|--|-----------------|------|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic             |                 |      |
|  | 32-Channel Intermediate Voltage Controller |                 |      |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   | Liquid Xenon (APD Bias Control)            |                 |      |
| PROJECT: Liquid Xenon  |  |                 |      |
| DESIGNED: Chris Ohlmann  | REVISIONS ARE DETAILED IN THE DOCUMENT:    | No Revisions    |      |
| DRAWN: Chris Ohlmann   | LIST: LXe_IVC32.xls                        | DOCUMENT NUMBER | REV. |
| CHECKED: L. Kurchaninov  | DATE: 3/14/2007                            | XEL0182         | _    |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01                            |                 |      |



Channel0

|  |   |  |
|--|---|--|
|  <div>Canada's National Laboratory for Particle and Nuclear Physics<br/>4004 Wesbrook Mall, Vancouver, BC, Canada V6T 2A3<br/>Tel: [604] 222-1047 www.triumf.ca Fax: [604] 222-1074</div> | Output Channel Block Schematic<br>32-Channel Intermediate Voltage Controller<br>Liquid Xenon (APD Bias Control) |  |
| THESE DESIGNS WERE REALIZED USING MENTOR GRAPHICS PRODUCTS UNDER THE HIGHER EDUCATION PROGRAM.   | REVISIONS ARE DETAILED IN THE DOCUMENT: No Revisions  |  |
| PROJECT: Liquid Xenon  | LIST: LXe_IVC32.xls   |  |
| DESIGNED: Chris Ohlmann  | DATE: 3/14/2007   |  |
| DRAWN: Chris Ohlmann   | DOCUMENT NUMBER   |  |
| CHECKED: L. Kurchaninov  | XEL0182   |  |
| APPROVED: L. Kurchaninov   | SHEET: 01 OF 01   |  |
|  | REV.  |  |