

## QBD series Pockels cell driver

### User Manual

**Warning!** This equipment produces high voltages that can be very dangerous.  
Please read user manual before starting operations.

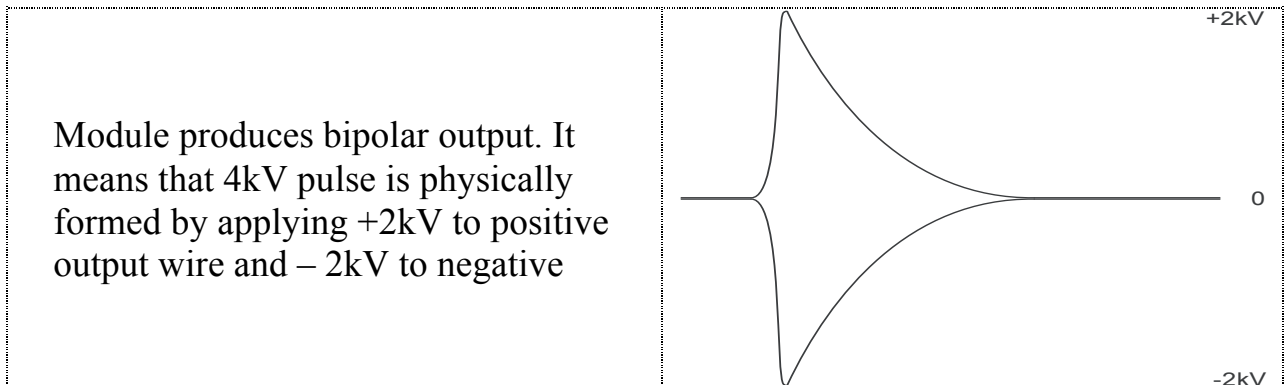
**Important note:** please measure the output with symmetrical (differential) high voltage probe only. Measurement made with inappropriate equipment is a common cause of driver's failure.



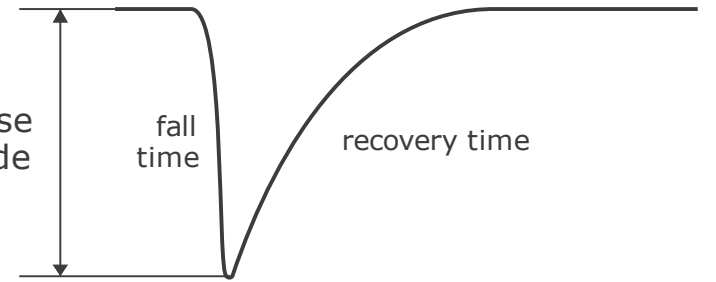
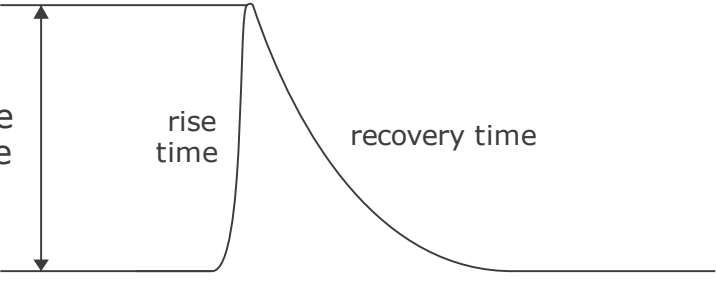
## Overview

QBD series Pockels cell drivers produce high voltage pulses with high repetition rates, fast risetimes (falltimes) and adjustable voltage amplitude. Drivers are available in two modifications: QBD-DN for pull-down scheme and QBD-UP for push-up scheme. Two control types are available: manual and automatic

## Pulse parameters



**Attention!** Further description of HV output will be given in terms of voltage differences. Please keep it in mind!

|  |  |
|--|--|
| <p>Typical pulse shape (QBD-DN modification)</p> |  |
| <p>Typical pulse shape (QBD-UP modification)</p> |  |
| <p>Risetime/Falltime</p>                         | <p>~20 ns<sup>1, 2</sup></p>   |
| <p>Recovery time<sup>2</sup></p>                 | <p>~10 us @ 100 pF load</p>  |
| <p>HV pulse amplitude</p>                        | <p>from HVmin to HVmax<sup>3</sup></p>   |
| <p>Repetition rates</p>                          | <p>from single shot to ~100 kHz<sup>2</sup></p>                                      |

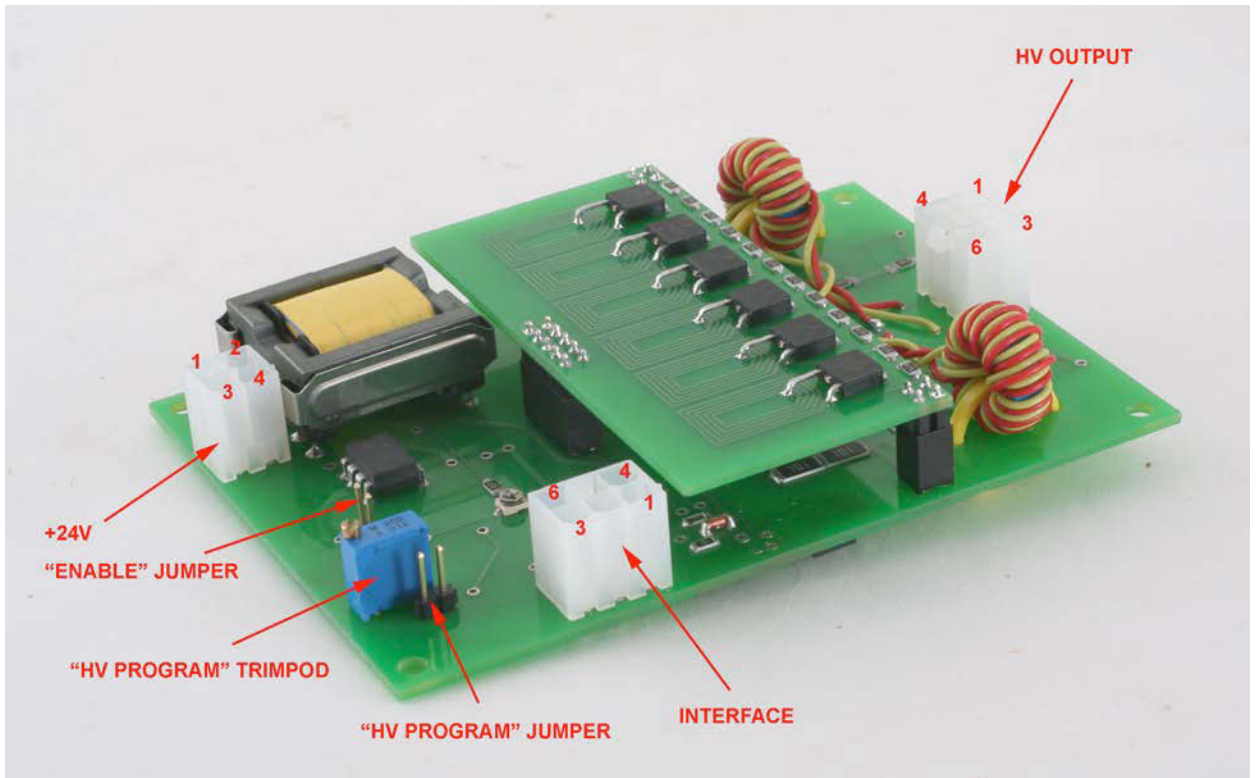
<sup>1</sup> at 10-90% level

<sup>2</sup> depends on HV pulse amplitude and capacity load

<sup>3</sup> HVmin and HVmax values see in part number table

## Connections, signals, signal descriptions

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There are three connectors at Pockels cell driver board. Hereafter is description of corresponded female connectors (supplied with the board)

### "ENABLE" JUMPER:

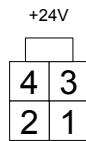
Use "*ENABLE*" *JUMPER* instead of "*ENABLE*" *PIN3* of *INTERFACE*. Don't use "*ENABLE*" *JUMPER* and "*ENABLE*" *PIN* at the same time.

### "HV PROGRAM" JUMPER AND "HV PROGRAM" TRIMPOD:

Use "*HV PROGRAM*" *JUMPER* instead of "*HV PROGRAM*" *PIN6* of *INTERFACE*. If jumper is on it sets output voltage according to "*HV PROGRAM*" *TRIMPOD* state.

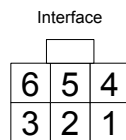
Don't use "*HV PROGRAM*" *JUMPER* and "*HV PROGRAM*" *PIN* at the same time.

### +24V (Molex 39-30-1040):



| PIN (color)  | DESIGNATION | DESCRIPTION   |
|--------------|-------------|---|
| 1, 2 (red)   | +24V        | INPUT positive 24VDC for turn on the Pockels cell driver<br>Regulation: 22-28V, typical |
| 3, 4 (black) | RETURN      | Return from power supply producing +24VDC   |

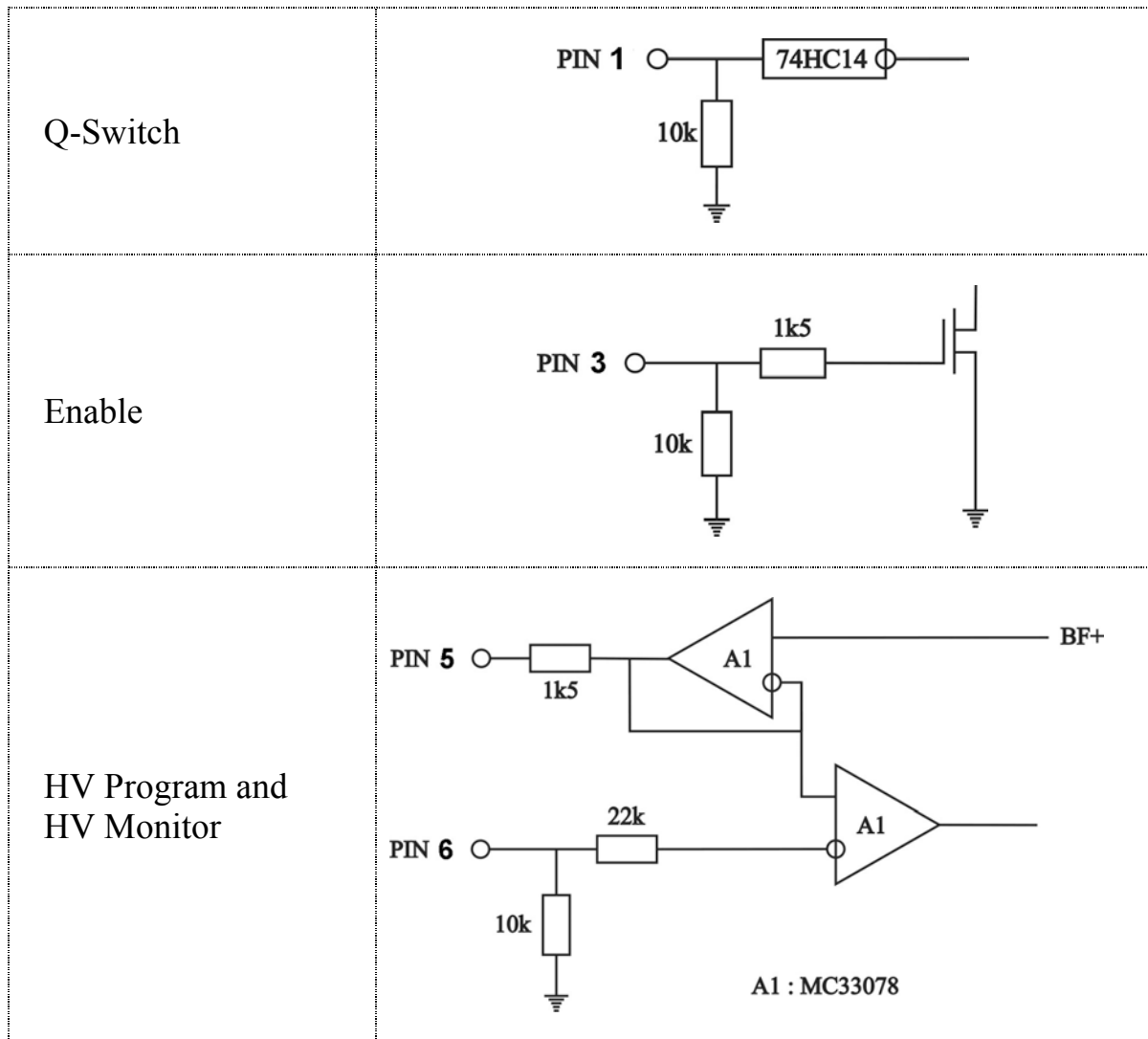
### INTERFACE (Molex 39-30-1060):



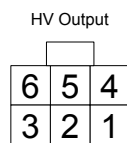
| PIN (color)  | DESIGNATION      | DESCRIPTION   |
|--------------|------------------|---|
| 1 (orange)   | Q-switch         | Step from "0" or "1" on PIN1 forms Q-Switched pulse on Pockels Cell   |
| 2, 4 (black) | Interface Return | PIN2 and PIN4 are connected to the circuit ground of all internal circuits  |
| 3 (blue)     | Enable           | The high voltage output is enabled by PIN3 ("1" – enable, "0" – disable)  |
| 5 (purple)   | HV Monitor       | The voltage at PIN5 is a monitor signal proportional to the measured value of high voltage output<br><b>HVmax</b> corresponds to 10V at PIN5,<br><b>HVmin</b> corresponds to approx. 4V at PIN5 |
| 6 (yellow)   | HV Program       | Positive DC voltage applied to PIN6 sets up high voltage value <b>HV</b><br><b>HVmax</b> corresponds to 10V at PIN6,<br><b>HVmin</b> corresponds to approx. 4V at PIN6                          |

"0" means logical 0 low level (0V), "1" means logical 1 high level (5V)

## INTERFACE CIRCUITS



### HV OUTPUT (Molex 39-30-1060):



| QBD-series, UP-modification |             |             | QBD-series, DN-modification |             |             |
|-----------------------------|-------------|-------------|-----------------------------|-------------|-------------|
| PIN (color)                 | DESIGNATION | DESCRIPTION | PIN (color)                 | DESIGNATION | DESCRIPTION |
| 1 (blue)                    | Negative    | HV Negative | 1 (red)                     | Positive    | HV Positive |
| 2-5                         | N/C         |             | 2-5                         | N/C         |             |
| 6 (red)                     | Positive    | HV Positive | 6 (blue)                    | Negative    | HV Negative |

## Safety

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**Warning!** This equipment produces high voltages that can be very dangerous. Don't be careless around this equipment.

- To provide safety the QBD-series Pockels cell driver module is designed to be powered with supply voltage +24VDC, which must be galvanically separated from mains.
- It is the user's responsibility to ensure that personnel are prevented from accidentally contacting the QBD-series Pockels cell driver module, especially the high voltage connector and cable. **Casual contact could be fatal.** Output cables must have good isolation for output voltage and low capacitance.
- After shut down, do not touch the load until it has been discharged. Use an appropriate measurement device to check for complete discharge.
- Disconnect the QBD-series Pockels cell driver module from DC power supply before changing electrical or mechanical connections.

## Operations (Manual control)

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1. Connect +24VDC power supply, pulse generator and Pockels cell
2. Set up "*HV PROGRAM*" JUMPER
3. Turn on +24VDC power supply
4. Set up "*ENABLE*" JUMPER
5. Use "*HV PROGRAM*" TRIMPOD to set up required output voltage
6. Send driving pulses from pulse generator to *PINI* of *INTERFACE*
7. To power down the driver, turn off +24VDC power supply or remove "*ENABLE*" JUMPER

## Operations (Automatic control)

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1. Connect +24V, *INTERFACE* and *HV OUTPUT* connectors to the board.
2. Remove "*HV PROGRAM*" JUMPER, remove "*ENABLE*" JUMPER
3. *DISABLE* the high voltage output
4. Apply the correct nominal *DC INPUT* power to the module
5. Set up the required output voltage by applying a DC voltage to the *HV PROGRAM PIN6* of *INTERFACE*
6. *ENABLE* the high voltage output
7. Send driving pulses to *PINI* of *INTERFACE*
8. To power down the driver, remove *DC INPUT* power or *DISABLE* high voltage output

## Specification

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### ELECTRICAL SPECIFICATION

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|                       |                               |
|-----------------------|-------------------------------|
| <b>Input</b>          | +24V DC; 0,8A max             |
| <b>Output</b>         |                               |
| Risetime/Falltime     | ~20ns(depends on load)        |
| Recovery time         | depends on load (~10us@100pF) |
| HV pulse amplitude    | see Part number table         |
| Repetition rate       | up to 100kHz                  |
| Capacity load         | up to 500pF                   |
| <b>Safety</b>         |                               |
| Leakage current       | not more then 150μA           |
| <b>Environment</b>    |                               |
| Operation Temperature | -20...+45C                    |
| Storage Temperature   | -40...+85C                    |
| Humidity              | 90%, non-condensing           |

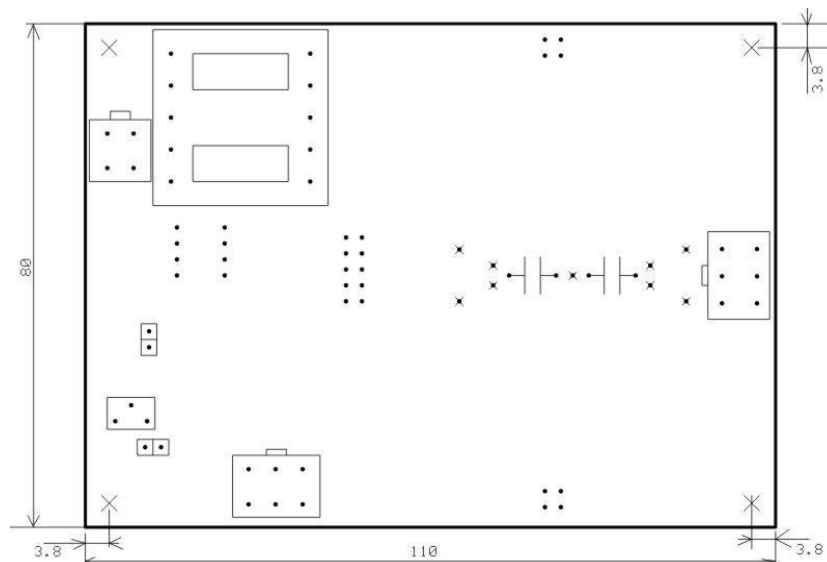
### MECHANICAL SPECIFICATION

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|              |              |
|--------------|--------------|
| Size (LxWxH) | 110x80x25 mm |
| Weight       | 0,1 kg       |

### DRAWINGS

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## Part number table

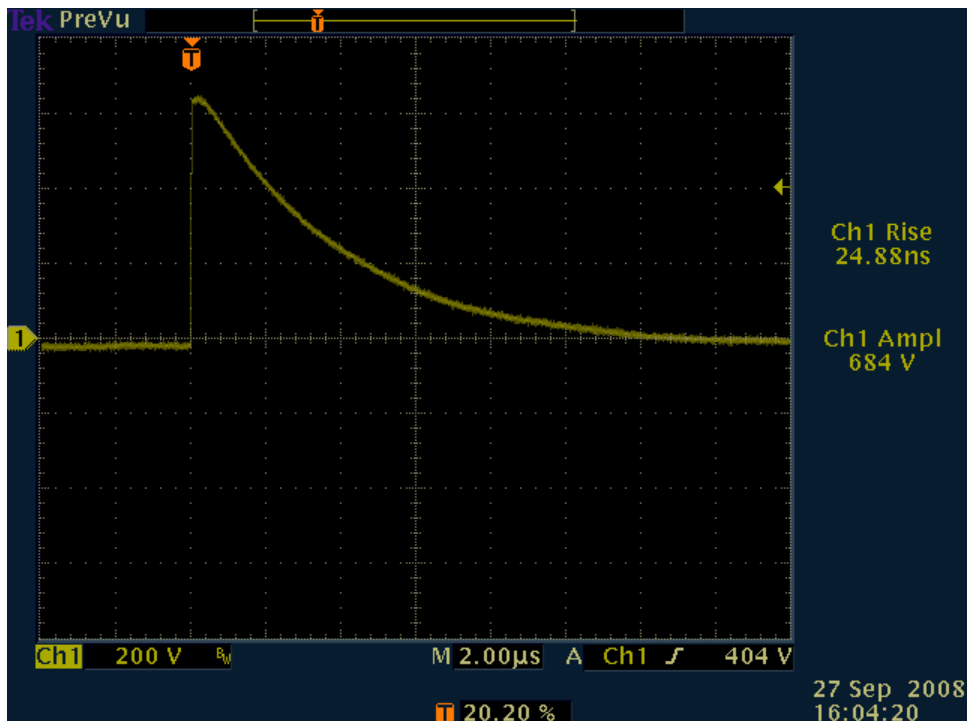
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| Part Number                | HVmax | HVmin |
|----------------------------|-------|-------|
| QBD-6024-DN<br>QBD-6024-UP | 6000  | 2400  |
| QBD-5020-DN<br>QBD-5020-UP | 5000  | 2000  |
| QBD-4016-DN<br>QBD-4016-UP | 4000  | 1600  |
| QBD-3012-DN<br>QBD-3012-UP | 3000  | 1200  |
| QBD-2008-DN<br>QBD-2008-UP | 2000  | 800   |

Suffixes “DN” means pull-down scheme, “UP” – push-up scheme (see also *Pulse parameters* section)

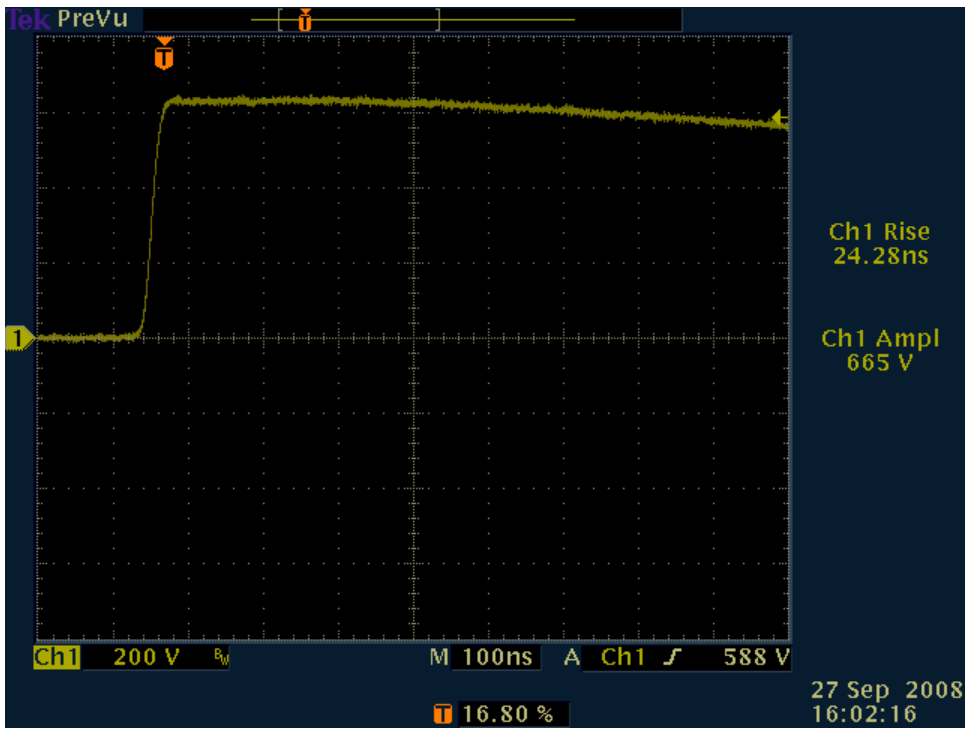
## Typical output

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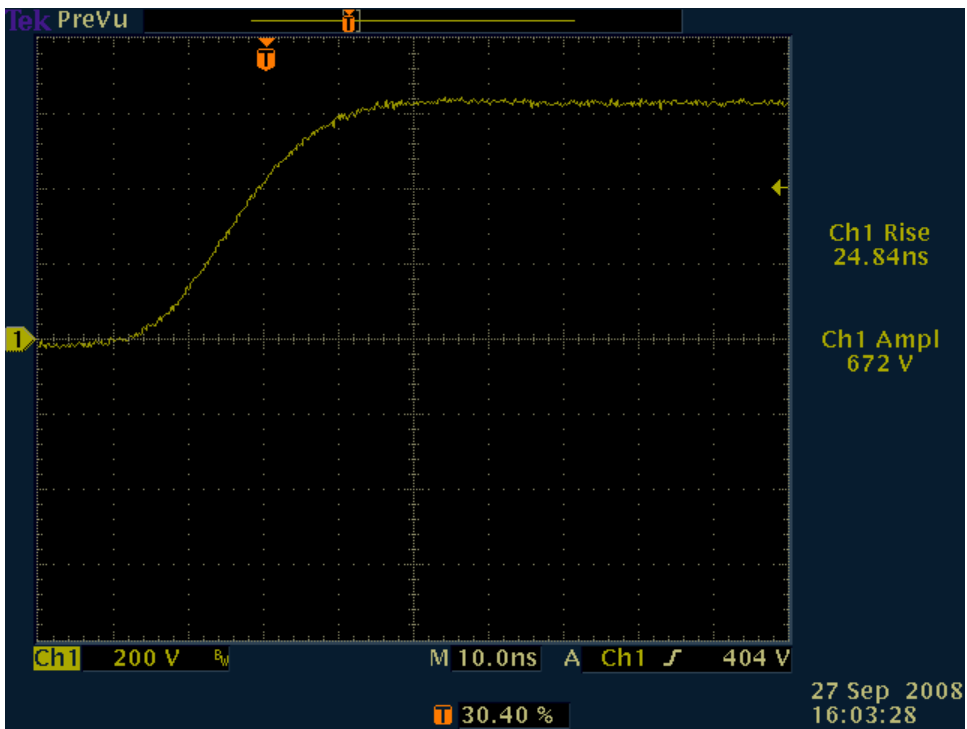


time scale: 2us / div





time scale: 100ns / div



time scale: 10ns / div