

# ELM76xxxxB CMOS Voltage detector with delay function

## ■ General description

ELM76xxxxB is CMOS voltage detector IC with delay function; external capacitor is unnecessary for the delay time circuit. There are 4 types of delay time selection of ELM76series: Typ.250ms, Typ.500ms, Typ.150ms, Typ.50ms. The output pin of ELM76series is only available in CMOS. Two output logic modes are available, RESET and RESET. The output level is very high for RESET mode and low for RESET mode when Vdd is lower than detection voltage. The standard detection voltages are 2.2V, 3.0V, 4.8V and ELM76 series can also be made as semi-custom ICs within the range of 1.9V~4.8V by 0.1V step.

## ■ Features

- Detection voltage range : 1.9V~4.8V (by 0.1V)
- Low current consumption : Typ. 7 $\mu$ A
- Accuracy of detection voltage :  $\pm 2.0\%$
- Delay time after Vdd recovery : Typ. 250ms, Typ. 500ms  
Typ. 150ms, Typ. 50ms
- Hysteresis voltage : Typ. Vdetn  $\times$  1.04
- Package : SOT-23

## ■ Application

- Reset for microcomputers
- Voltage power shortage detectors
- Switch of back-up power source
- Battery checkers

## ■ Maximum absolute ratings

| Parameter             | Symbol | Limit           | Unit |
|-----------------------|--------|-----------------|------|
| Power supply voltage  | Vdd    | 10              | V    |
| Output voltage        | Vout   | Vss-0.3~Vdd+0.3 | V    |
| Output current        | Iout   | 20              | mA   |
| Power dissipation     | Pd     | 200             | mW   |
| Operating temperature | Top    | -40~+85         | °C   |
| Storage temperature   | Tstg   | -55~+125        | °C   |

## ■ Selection guide

ELM76xxxxB-x

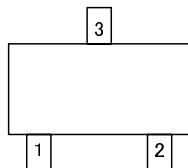
| Symbol |                   |                                                              |
|--------|-------------------|--------------------------------------------------------------|
| a,b    | Detection voltage | e.g. :<br>22: Vdetn=2.2V<br>30: Vdetn=3.0V<br>48: Vdetn=4.8V |
| c      | Output mode       | L : RESET output mode<br>H : RESET output mode               |
| d      | Delay time        | A : Typ.250ms, B : Typ.500ms<br>C : Typ.150ms, D : Typ.50ms  |
| e      | Product version   | B                                                            |
| f      | Taping direction  | S : Refer to PKG file<br>N : Refer to PKG file               |

ELM76 x x x x B - x  
↑ ↑ ↑ ↑ ↑ ↑  
a b c d e f

# ELM76xxxxB CMOS Voltage detector with delay function

## Pin configuration

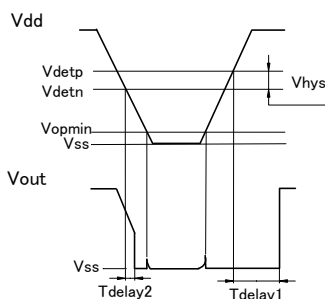
SOT-23 (TOP VIEW)



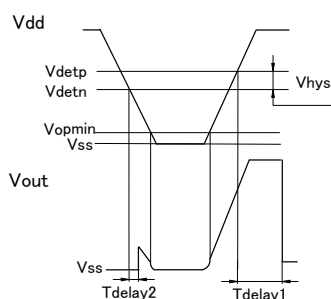
| Pin No. | Pin name |
|---------|----------|
| 1       | VSS      |
| 2       | OUT      |
| 3       | VDD      |

## Timing chart

$\overline{\text{RESET}}$  output logic



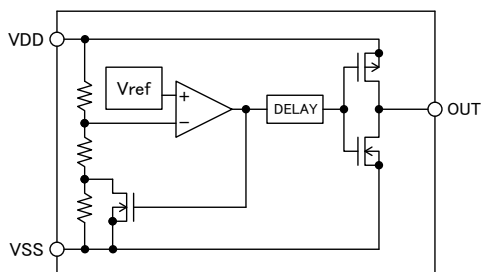
RESET output logic



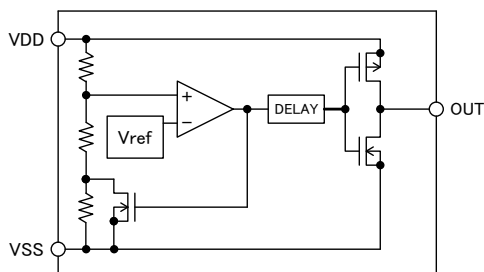
- For  $\overline{\text{RESET}}$ (ELM76xxLxB) output logic products, ELM recommends to make the rising rate of Vdd slower than  $10\text{V}/\mu\text{s}$ , or to install a capacitor larger than  $0.001\mu\text{F}$  between VSS and OUT terminals.

## Block diagram

$\overline{\text{RESET}}$  output logic



RESET output logic



# ELM76xxxxB CMOS Voltage detector with delay function

## ■Electrical characteristics

Vdetn=2.2V (ELM7622xxB)

Top=25°C

| Parameter                           | Symbol                               | Condition          | Min.           | Typ.           | Max.           | Unit   | Note  |
|-------------------------------------|--------------------------------------|--------------------|----------------|----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                |                    | 2.156          | 2.200          | 2.244          | V      | 2     |
| Hysteresis width                    | Vhys                                 |                    | Vdetn<br>×0.02 | Vdetn<br>×0.03 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                  | Vdd=3.0V           |                | 7.0            | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                  |                    | 1.000          |                | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                | Vdd=1.0V, Vds=0.3V | 0.05           | 0.17           |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 1.5            | 3.2            |                |        |       |
|                                     | Ioutp                                | Vdd=3.0V, Vds=0.4V | 0.4            | 1.0            |                |        | 3-(2) |
| RESET output curemnt                | Ioutn                                | Vdd=3.0V, Vds=0.4V | 2.5            | 5.5            |                | mA     | 3-(1) |
|                                     | Ioutp                                | Vdd=2.0V, Vds=0.4V | 0.2            | 0.6            |                |        | 3-(2) |
| Delay time(50ms)                    | Tdelay1                              | Vdd=1.0V~3.0V      | 40             | 50             | 60             | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10             |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 120            | 150            | 180            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10             |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 200            | 250            | 300            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10             |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 400            | 500            | 600            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10             |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta Top}$ | Top=-40~+85°C      |                | +100           |                | ppm/°C |       |

\* Note : test circuit No.

Vdetn=2.4V (ELM7624xxB)

Top=25°C

| Parameter                           | Symbol                               | Condition          | Min.           | Typ.            | Max.           | Unit   | Note  |
|-------------------------------------|--------------------------------------|--------------------|----------------|-----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                |                    | 2.352          | 2.400           | 2.448          | V      | 2     |
| Hysteresis width                    | Vhys                                 |                    | Vdetn<br>×0.02 | Vdetn<br>×0.035 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                  | Vdd=3.0V           |                | 7.0             | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                  |                    | 1.000          |                 | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                | Vdd=1.0V, Vds=0.3V | 0.05           | 0.17            |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 1.5            | 3.2             |                |        |       |
|                                     | Ioutp                                | Vdd=3.0V, Vds=0.4V | 0.4            | 1.0             |                |        | 3-(2) |
| RESET output curemnt                | Ioutn                                | Vdd=3.0V, Vds=0.4V | 2.5            | 5.5             |                | mA     | 3-(1) |
|                                     | Ioutp                                | Vdd=2.0V, Vds=0.4V | 0.2            | 0.6             |                |        | 3-(2) |
| Delay time(50ms)                    | Tdelay1                              | Vdd=1.0V~3.0V      | 40             | 50              | 60             | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 120            | 150             | 180            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 200            | 250             | 300            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 400            | 500             | 600            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10              |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta Top}$ | Top=-40~+85°C      |                | +100            |                | ppm/°C |       |

\* Note : test circuit No.

# ELM76xxxxB CMOS Voltage detector with delay function

Vdetn=2.6V (ELM7626xxB)

Top=25°C

| Parameter                           | Symbol                               | Condition          | Min.           | Typ.            | Max.           | Unit   | Note  |
|-------------------------------------|--------------------------------------|--------------------|----------------|-----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                |                    | 2.548          | 2.600           | 2.652          | V      | 2     |
| Hysteresis width                    | Vhys                                 |                    | Vdetn<br>×0.02 | Vdetn<br>×0.035 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                  | Vdd=3.0V           |                | 7.0             | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                  |                    | 1.000          |                 | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                | Vdd=1.0V, Vds=0.3V | 0.05           | 0.17            |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 1.5            | 3.2             |                |        |       |
|                                     | Ioutp                                | Vdd=3.0V, Vds=0.4V | 0.4            | 1.0             |                |        | 3-(2) |
| RESET output current                | Ioutn                                | Vdd=3.0V, Vds=0.4V | 2.5            | 5.5             |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 0.2            | 0.6             |                |        |       |
|                                     | Ioutp                                | Vdd=3.0V, Vds=0.4V |                |                 |                |        | 3-(2) |
| Delay time(50ms)                    | Tdelay1                              | Vdd=1.0V~3.0V      | 40             | 50              | 60             | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 120            | 150             | 180            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 200            | 250             | 300            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                              | Vdd=1.0V~3.0V      | 400            | 500             | 600            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=3.0V~1.0V      |                | 10              |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta Top}$ | Top=-40~+85°C      |                | +100            |                | ppm/°C |       |

\* Note : test circuit No.

Vdetn=2.9V (ELM7629xxB)

Top=25°C

| Parameter                           | Symbol                               | Condition          | Min.           | Typ.           | Max.           | Unit   | Note  |
|-------------------------------------|--------------------------------------|--------------------|----------------|----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                |                    | 2.842          | 2.900          | 2.958          | V      | 2     |
| Hysteresis width                    | Vhys                                 |                    | Vdetn<br>×0.02 | Vdetn<br>×0.04 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                  | Vdd=4.5V           |                | 7.0            | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                  |                    | 1.000          |                | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                | Vdd=1.0V, Vds=0.3V | 0.05           | 0.17           |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 1.5            | 3.2            |                |        |       |
|                                     | Ioutp                                | Vdd=4.5V, Vds=0.4V | 0.6            | 1.5            |                |        | 3-(2) |
| RESET output current                | Ioutn                                | Vdd=4.5V, Vds=0.4V | 3.5            | 8.0            |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 0.2            | 0.6            |                |        |       |
| Delay time(50ms)                    | Tdelay1                              | Vdd=1.0V~4.5V      | 40             | 50             | 60             | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 120            | 150            | 180            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 200            | 250            | 300            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 400            | 500            | 600            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta Top}$ | Top=-40~+85°C      |                | +100           |                | ppm/°C |       |

\* Note : test circuit No.

# ELM76xxxxB CMOS Voltage detector with delay function

Vdetn=3.0V (ELM7630xxB)

Top=25°C

| Parameter                           | Symbol                               | Condition          | Min.           | Typ.           | Max.           | Unit   | Note  |
|-------------------------------------|--------------------------------------|--------------------|----------------|----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                |                    | 2.940          | 3.000          | 3.060          | V      | 2     |
| Hysteresis width                    | Vhys                                 |                    | Vdetn<br>×0.02 | Vdetn<br>×0.04 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                  | Vdd=4.5V           |                | 7.0            | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                  |                    | 1.000          |                | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                | Vdd=1.0V, Vds=0.3V | 0.05           | 0.17           |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 1.5            | 3.2            |                |        |       |
|                                     | Ioutp                                | Vdd=4.5V, Vds=0.4V | 0.6            | 1.5            |                |        | 3-(2) |
| RESET output current                | Ioutn                                | Vdd=4.5V, Vds=0.4V | 3.5            | 8.0            |                | mA     | 3-(1) |
|                                     | Ioutp                                | Vdd=2.0V, Vds=0.4V | 0.2            | 0.6            |                |        |       |
| Delay time(50ms)                    | Tdelay1                              | Vdd=1.0V~4.5V      | 40             | 50             | 60             | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 120            | 150            | 180            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 200            | 250            | 300            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 400            | 500            | 600            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta Top}$ | Top=-40~+85°C      |                | +100           |                | ppm/°C |       |

\* Note : test circuit No.

Vdetn=3.4V (ELM7634xxB)

Top=25°C

| Parameter                           | Symbol                               | Condition          | Min.           | Typ.           | Max.           | Unit   | Note  |
|-------------------------------------|--------------------------------------|--------------------|----------------|----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                |                    | 3.332          | 3.400          | 3.468          | V      | 2     |
| Hysteresis width                    | Vhys                                 |                    | Vdetn<br>×0.02 | Vdetn<br>×0.04 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                  | Vdd=4.5V           |                | 7.0            | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                  |                    | 1.000          |                | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                | Vdd=1.0V, Vds=0.3V | 0.05           | 0.17           |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 1.5            | 3.2            |                |        |       |
|                                     | Ioutp                                | Vdd=4.5V, Vds=0.4V | 0.6            | 1.5            |                |        | 3-(2) |
| RESET output current                | Ioutn                                | Vdd=4.5V, Vds=0.4V | 3.5            | 8.0            |                | mA     | 3-(1) |
|                                     | Ioutp                                | Vdd=2.0V, Vds=0.4V | 0.2            | 0.6            |                |        |       |
| Delay time(50ms)                    | Tdelay1                              | Vdd=1.0V~4.5V      | 40             | 50             | 60             | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 120            | 150            | 180            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 200            | 250            | 300            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 400            | 500            | 600            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta Top}$ | Top=-40~+85°C      |                | +100           |                | ppm/°C |       |

\* Note : test circuit No.

# ELM76xxxxB CMOS Voltage detector with delay function

Vdetn=4.0V (ELM7640xxB)

Top=25°C

| Parameter                           | Symbol                               | Condition          | Min.           | Typ.           | Max.           | Unit   | Note  |
|-------------------------------------|--------------------------------------|--------------------|----------------|----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                |                    | 3.920          | 4.000          | 4.080          | V      | 2     |
| Hysteresis width                    | Vhys                                 |                    | Vdetn<br>×0.02 | Vdetn<br>×0.04 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                  | Vdd=4.5V           |                | 7.0            | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                  |                    | 1.000          |                | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                | Vdd=1.0V, Vds=0.3V | 0.05           | 0.17           |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 1.5            | 3.2            |                |        |       |
|                                     | Ioutp                                | Vdd=4.5V, Vds=0.4V | 0.6            | 1.5            |                |        | 3-(2) |
| RESET output current                | Ioutn                                | Vdd=4.5V, Vds=0.4V | 3.5            | 8.0            |                | mA     | 3-(1) |
|                                     | Ioutp                                | Vdd=2.0V, Vds=0.4V | 0.2            | 0.6            |                |        |       |
| Delay time(50ms)                    | Tdelay1                              | Vdd=1.0V~4.5V      | 40             | 50             | 60             | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 120            | 150            | 180            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 200            | 250            | 300            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                              | Vdd=1.0V~4.5V      | 400            | 500            | 600            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=4.5V~1.0V      |                | 10             |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta Top}$ | Top=-40~+85°C      |                | +100           |                | ppm/°C |       |

\* Note : test circuit No.

Vdetn=4.4V (ELM7644xxB)

Top=25°C

| Parameter                           | Symbol                               | Condition          | Min.           | Typ.            | Max.           | Unit   | Note  |
|-------------------------------------|--------------------------------------|--------------------|----------------|-----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                |                    | 4.312          | 4.400           | 4.488          | V      | 2     |
| Hysteresis width                    | Vhys                                 |                    | Vdetn<br>×0.02 | Vdetn<br>×0.045 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                  | Vdd=6.0V           |                | 7.0             | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                  |                    | 1.000          |                 | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                | Vdd=1.0V, Vds=0.3V | 0.05           | 0.17            |                | mA     | 3-(1) |
|                                     |                                      | Vdd=2.0V, Vds=0.4V | 1.5            | 3.2             |                |        |       |
|                                     | Ioutp                                | Vdd=6.0V, Vds=0.4V | 0.8            | 2.0             |                |        | 3-(2) |
| RESET output current                | Ioutn                                | Vdd=6.0V, Vds=0.4V | 5              | 11              |                | mA     | 3-(1) |
|                                     | Ioutp                                | Vdd=2.0V, Vds=0.4V | 0.2            | 0.6             |                |        |       |
| Delay time(50ms)                    | Tdelay1                              | Vdd=1.0V~6.0V      | 40             | 50              | 60             | ms     | 4     |
|                                     | Tdelay2                              | Vdd=6.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                              | Vdd=1.0V~6.0V      | 120            | 150             | 180            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=6.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                              | Vdd=1.0V~6.0V      | 200            | 250             | 300            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=6.0V~1.0V      |                | 10              |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                              | Vdd=1.0V~6.0V      | 400            | 500             | 600            | ms     | 4     |
|                                     | Tdelay2                              | Vdd=6.0V~1.0V      |                | 10              |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta Top}$ | Top=-40~+85°C      |                | +100            |                | ppm/°C |       |

\* Note : test circuit No.

# ELM76xxxxB CMOS Voltage detector with delay function

Vdetn=4.8V (ELM7648xxB)

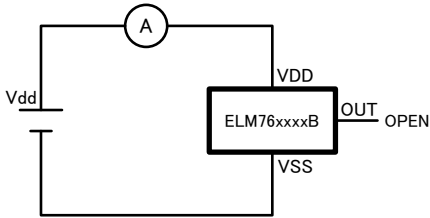
Top=25°C

| Parameter                           | Symbol                                  | Condition                  | Min.           | Typ.           | Max.           | Unit   | Note  |
|-------------------------------------|-----------------------------------------|----------------------------|----------------|----------------|----------------|--------|-------|
| Detection voltage                   | Vdetn                                   |                            | 4.704          | 4.800          | 4.896          | V      | 2     |
| Hysteresis width                    | Vhys                                    |                            | Vdetn<br>×0.02 | Vdetn<br>×0.05 | Vdetn<br>×0.06 | V      | 2     |
| Current consumption                 | Iss                                     | Vdd=6.0V                   |                | 7.0            | 14.0           | μA     | 1     |
| Power voltage                       | Vdd                                     |                            | 1.000          |                | 6.000          | V      | 2     |
| RESET output current                | Ioutn                                   | Vdd=1.0V, Vds=0.3V         | 0.05           | 0.17           |                | mA     | 3-(1) |
|                                     |                                         | Vdd=2.0V, Vds=0.4V         | 1.5            | 3.2            |                |        |       |
|                                     | Ioutp                                   | Vdd=6.0V, Vds=0.4V         | 0.8            | 2.0            |                |        | 3-(2) |
| RESET output current                | Ioutn                                   | Vdd=6.0V, Vds=0.4V         | 5.0            | 11.0           |                | mA     | 3-(1) |
|                                     | Ioutp                                   | Vdd=2.0V, Vds=0.4V         | 0.2            | 0.6            |                |        | 3-(2) |
| Delay time(50ms)                    | Tdelay1                                 | Vdd=1.0V~6.0V              | 40             | 50             | 60             | ms     | 4     |
|                                     | Tdelay2                                 | Vdd=6.0V~1.0V              |                | 10             |                | μs     |       |
| Delay time(150ms)                   | Tdelay1                                 | Vdd=1.0V~6.0V              | 120            | 150            | 180            | ms     | 4     |
|                                     | Tdelay2                                 | Vdd=6.0V~1.0V              |                | 10             |                | μs     |       |
| Delay time(250ms)                   | Tdelay1                                 | Vdd=1.0V~6.0V              | 200            | 250            | 300            | ms     | 4     |
|                                     | Tdelay2                                 | Vdd=6.0V~1.0V              |                | 10             |                | μs     |       |
| Delay time(500ms)                   | Tdelay1                                 | Vdd=1.0V~6.0V              | 400            | 500            | 600            | ms     | 4     |
|                                     | Tdelay2                                 | Vdd=6.0V~1.0V              |                | 10             |                | μs     |       |
| Temperature characteristic of Vdetn | $\frac{\Delta V_{detn}}{\Delta T_{op}}$ | T <sub>op</sub> =-40~+85°C |                | +100           |                | ppm/°C |       |

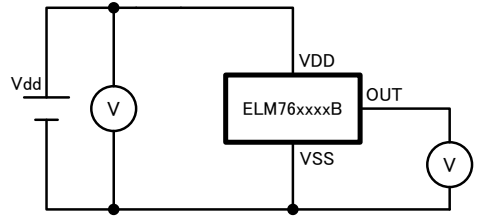
\* Note : test circuit No.

## Test circuits

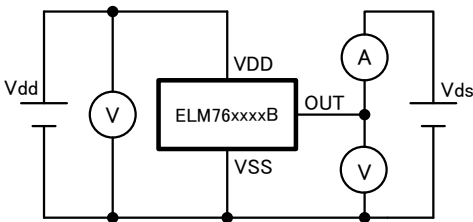
### 1) Current consumption



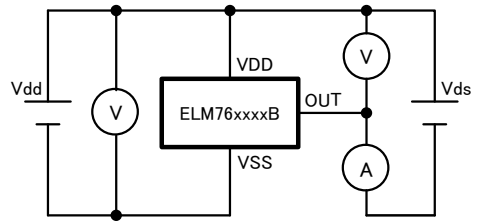
### 2) Detection voltage



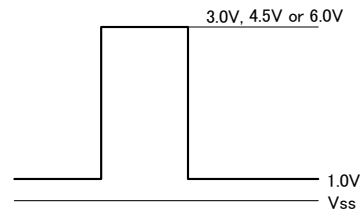
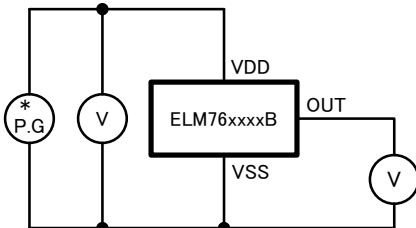
### 3)-(1) Output current (N-ch)



### 3)-(2) Output current (P-ch)



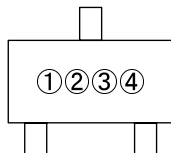
### 4) Delay time



\* Input pulse

## ■ Marking

SOT-23



Delay time : 250ms, 500ms, 150ms

No. ① : the integer digit of detection voltage

| Mark | Vdetn (H: RESET) | Delay time | Mark | Vdetn (L: RESET) | Delay time |
|------|------------------|------------|------|------------------|------------|
| 1    | 1.*V             | 250ms      | 2    | 1.*V             | 250ms      |
| H    | 2.*V             |            | L    | 2.*V             |            |
| J    | 3.*V             |            | M    | 3.*V             |            |
| K    | 4.*V             |            | N    | 4.*V             |            |
| 3    | 1.*V             | 500ms      | 4    | 1.*V             | 500ms      |
| F    | 2.*V             |            | V    | 2.*V             |            |
| G    | 3.*V             |            | W    | 3.*V             |            |
| Q    | 4.*V             |            | Y    | 4.*V             |            |
| 5    | 1.*V             | 150ms      | 6    | 1.*V             | 150ms      |
| P    | 2.*V             |            | U    | 2.*V             |            |
| S    | 3.*V             |            | R    | 3.*V             |            |
| T    | 4.*V             |            | Z    | 4.*V             |            |

No. ② : the decimal digit of detection voltage

| Mark | Vdetn | Mark | Vdetn |
|------|-------|------|-------|
| 0    | *.0V  | 5    | *.5V  |
| 1    | *.1V  | 6    | *.6V  |
| 2    | *.2V  | 7    | *.7V  |
| 3    | *.3V  | 8    | *.8V  |
| 4    | *.4V  | 9    | *.9V  |

No. ③ : Assembly lot No. 0~9

No. ④ : Assembly lot No. A~Z (I, O, X excepted)

Delay time : 50ms

No. ① : the integer digit of detection voltage

| Mark | Vdetn (H: RESET) | Mark | Vdetn (L: RESET) |
|------|------------------|------|------------------|
| J    | 1.*V             | E    | 1.*V             |
| K    | 2.*V             | F    | 2.*V             |
| L    | 3.*V             | G    | 3.*V             |
| M    | 4.*V             | H    | 4.*V             |

No. ② : the decimal digit of detection voltage

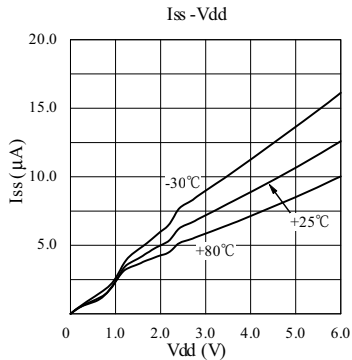
| Mark | Vdetn | Mark | Vdetn |
|------|-------|------|-------|
| A    | *.0V  | F    | *.5V  |
| B    | *.1V  | G    | *.6V  |
| C    | *.2V  | H    | *.7V  |
| D    | *.3V  | J    | *.8V  |
| E    | *.4V  | K    | *.9V  |

No. ③ : Assembly lot No. A~F

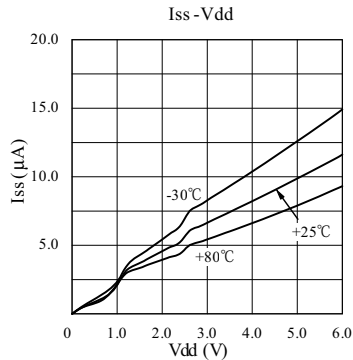
No. ④ : Assembly lot No. A~Z (I, O, X excepted)

## ■ Current consumption characteristics

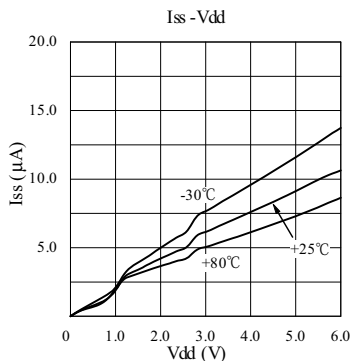
- Vdetn=2.2V (ELM7622xxB)



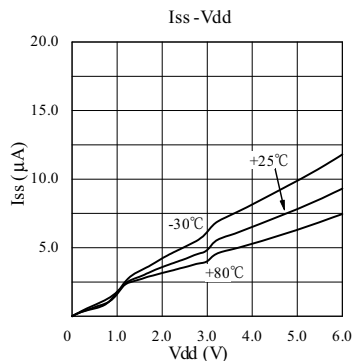
- Vdetn=2.4V (ELM7624xxB)



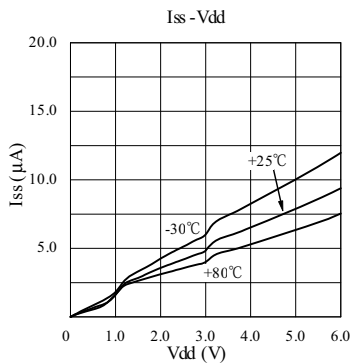
- Vdetn=2.6V (ELM7626xxB)



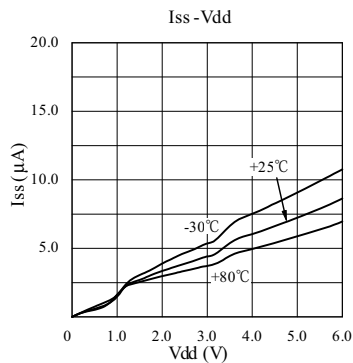
- Vdetn=2.9V (ELM7629xxB)



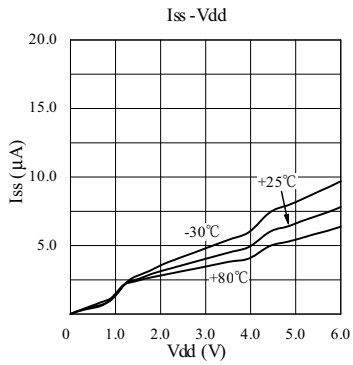
- Vdetn=3.0V (ELM7630xxB)



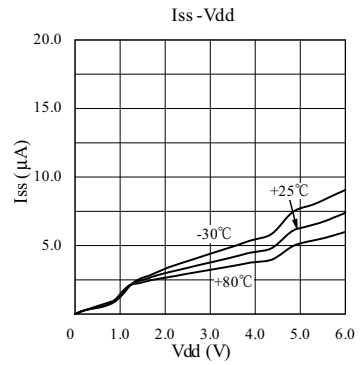
- Vdetn=3.4V (ELM7634xxB)



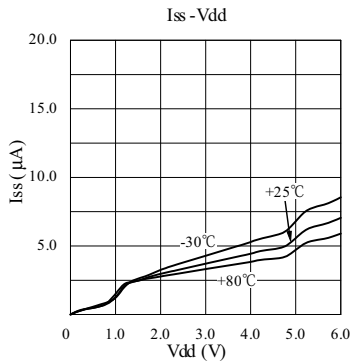
- Vdetn=4.0V (ELM7640xxB)



- Vdetn=4.4V (ELM7644xxB)

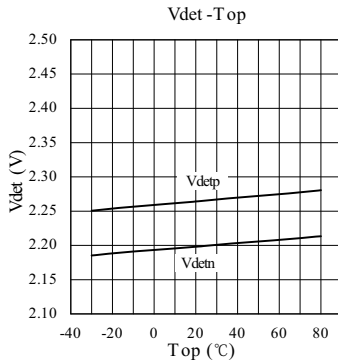


- Vdetn=4.8V (ELM7648xxB)

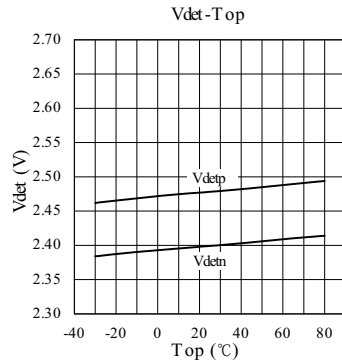


## ■ Detection voltage characteristics

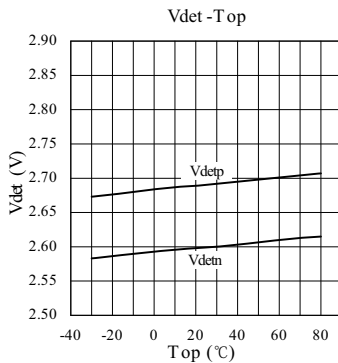
- Vdetn=2.2V (ELM7622xxB)



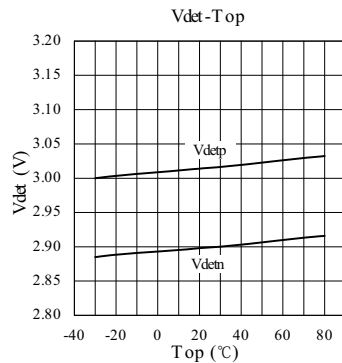
- Vdetn=2.4V (ELM7624xxB)



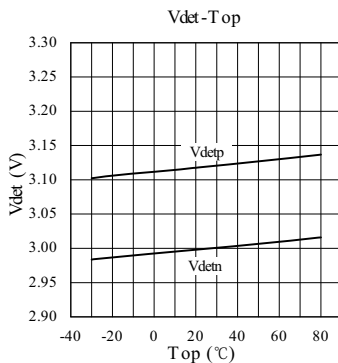
- Vdetn=2.6V (ELM7626xxB)



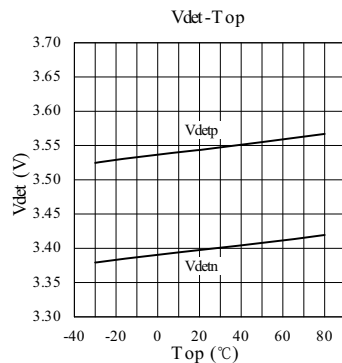
- Vdetn=2.9V (ELM7629xxB)



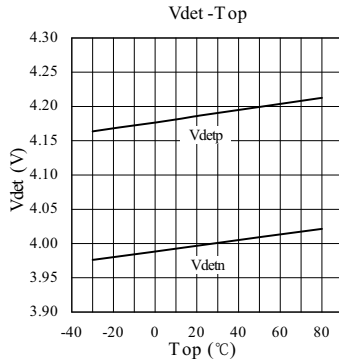
- Vdetn=3.0V (ELM7630xxB)



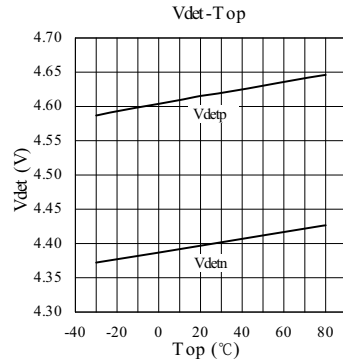
- Vdetn=3.4V (ELM7634xxB)



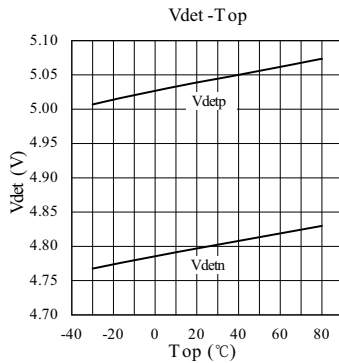
- Vdetn=4.0V (ELM7640xxB)



- Vdetn=4.4V (ELM7644xxB)

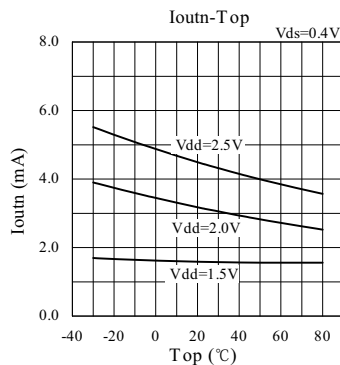
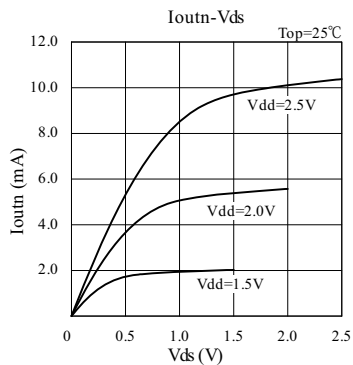
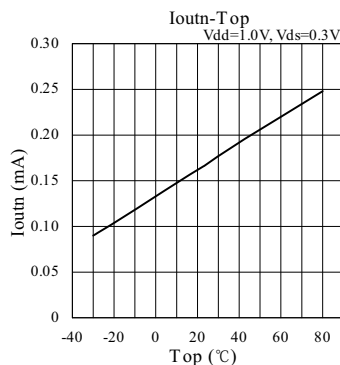
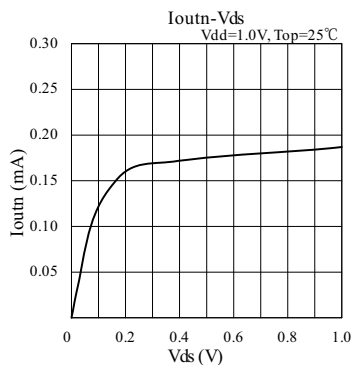


- Vdetn=4.8V (ELM7648xxB)

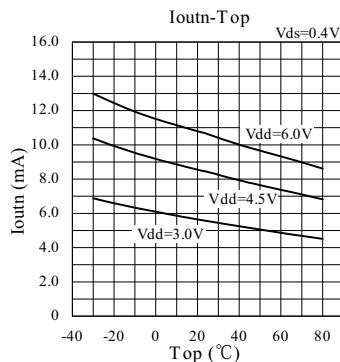
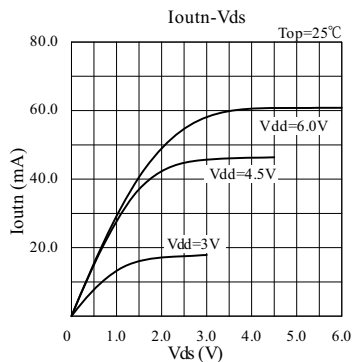


## ■ N-ch output current characteristics

### • ELM76xxLxB

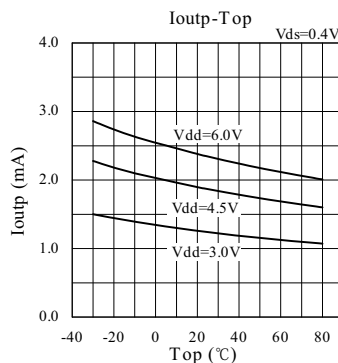
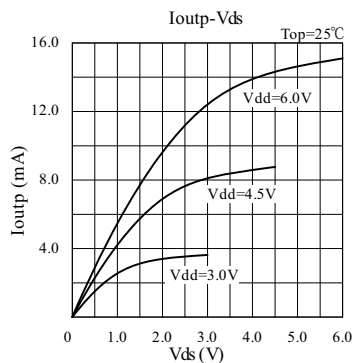


### • ELM76xxHxB

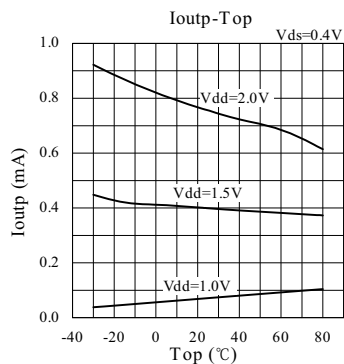
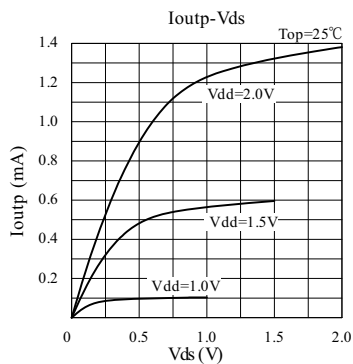


## ■ P-ch output current characteristics

- ELM76xxLxB

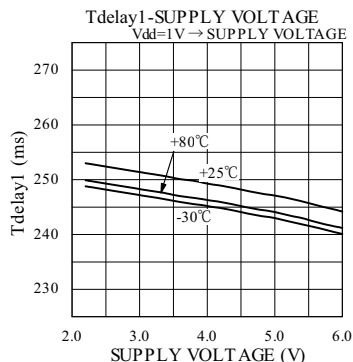
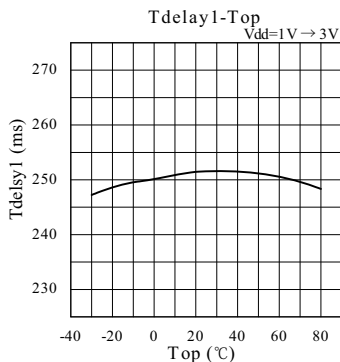


- ELM76xxHxB

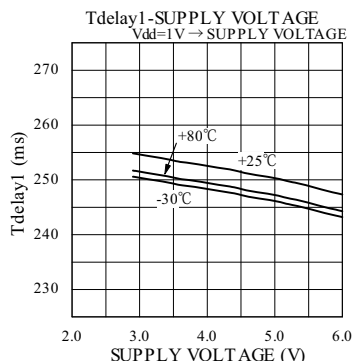
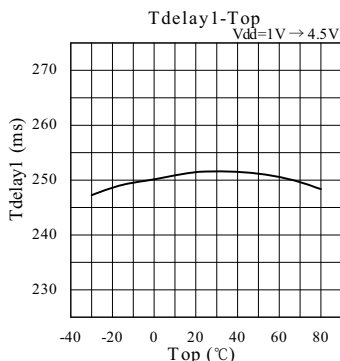


## ■ Delay time characteristics (Tdelay1)

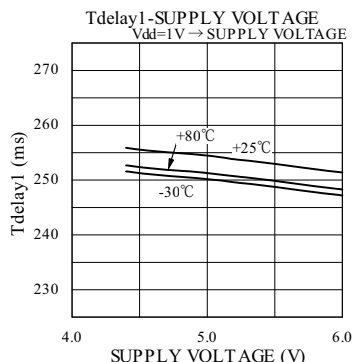
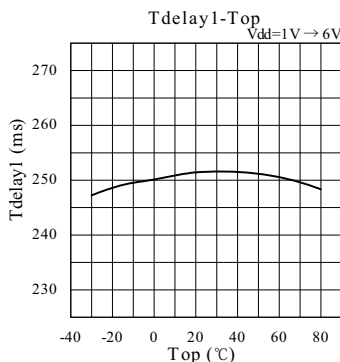
- Vdetn=2.2V, Vdetn=2.4V, Vdetn=2.6V (delay time : 250ms)



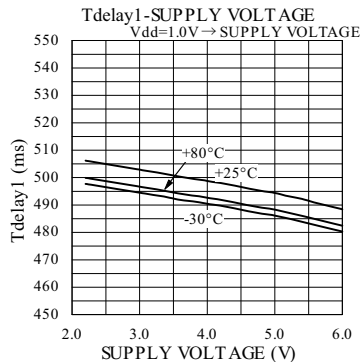
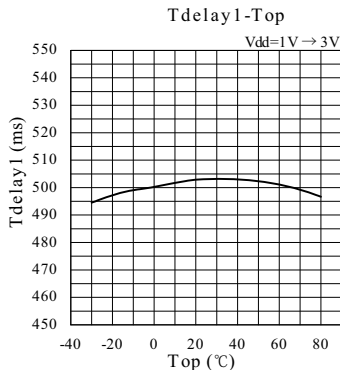
- Vdetn=2.9V, Vdetn=3.0V, Vdetn=3.4V, Vdetn=4.0V (delay time : 250ms)



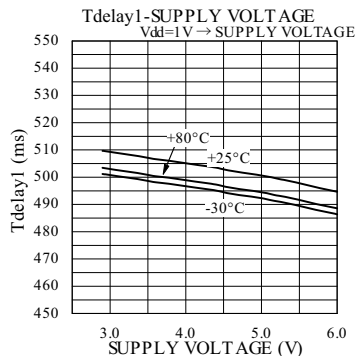
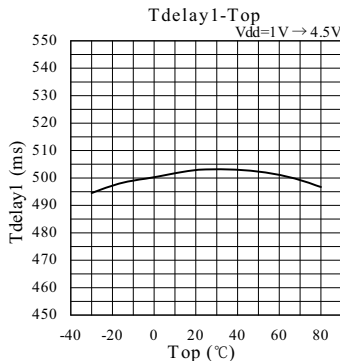
- Vdetn=4.4V, Vdetn=4.8V (delay time : 250ms)



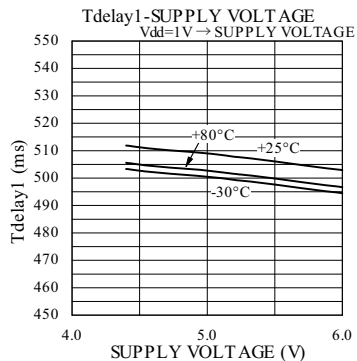
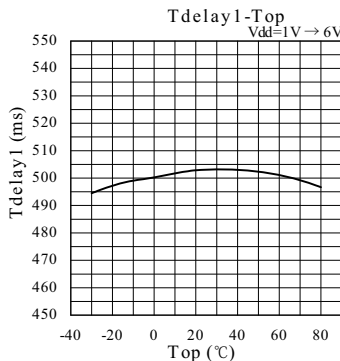
- Vdetn=2.2V, Vdetn=2.4V, Vdetn=2.6V (delay time : 500ms)



- Vdetn=2.9V, Vdetn=3.0V, Vdetn=3.4V, Vdetn=4.0V (delay time : 500ms)

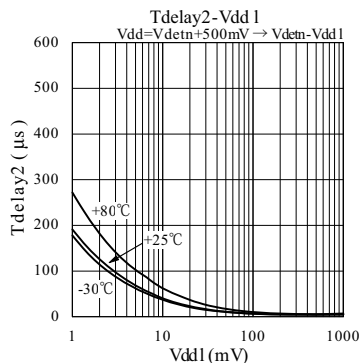
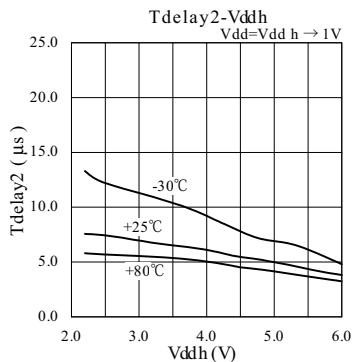


- Vdetn=4.4V, Vdetn=4.8V (delay time : 500ms)

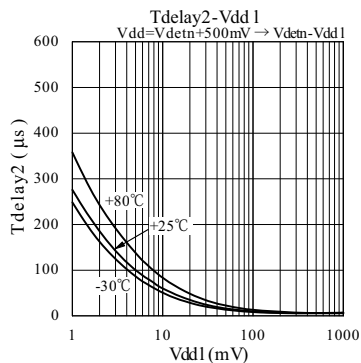
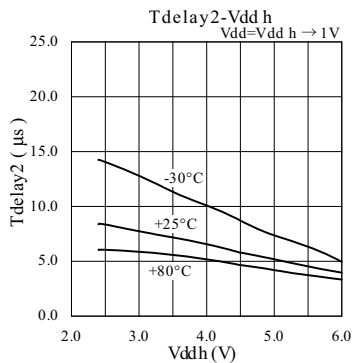


## ■ Delay time characteristics (Tdelay2)

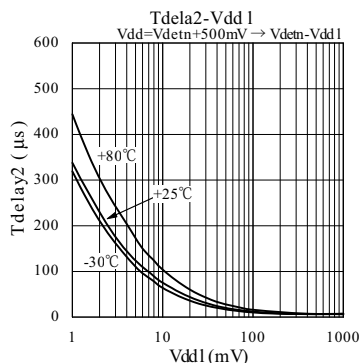
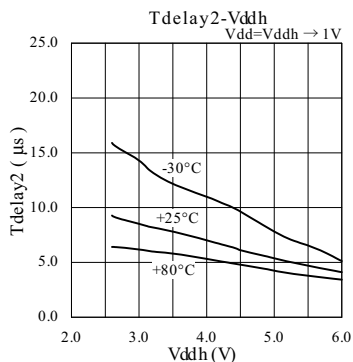
- Vdetn=2.2V (ELM7622xxB)



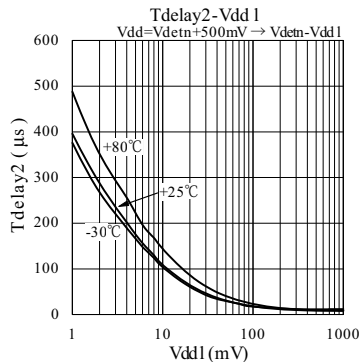
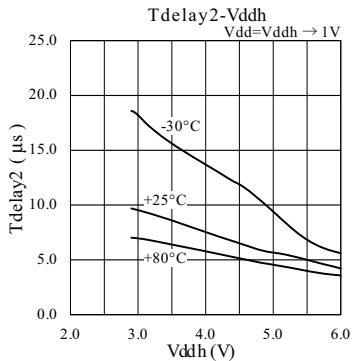
- Vdetn=2.4V (ELM7624xxB)



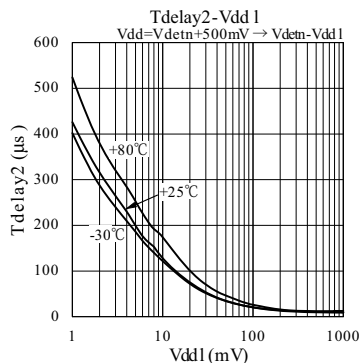
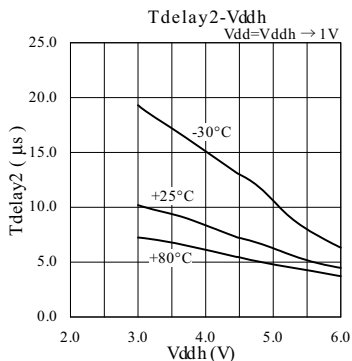
- Vdetn=2.6V (ELM7626xxB)



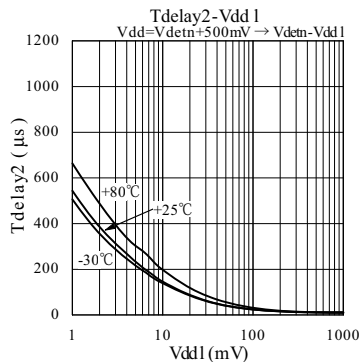
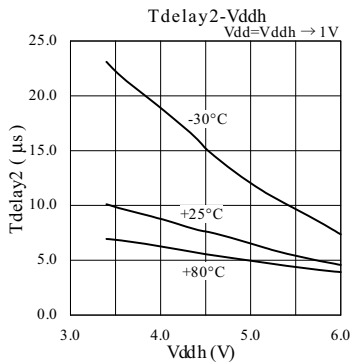
- $V_{detn}=2.9V$  (ELM7629xxB)



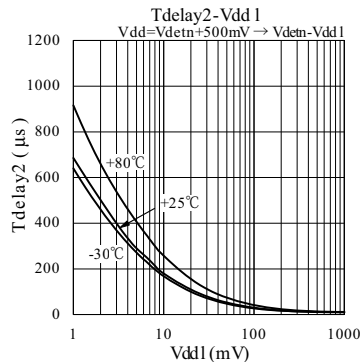
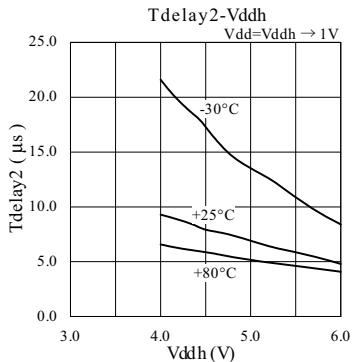
- $V_{detn}=3.0V$  (ELM7630xxB)



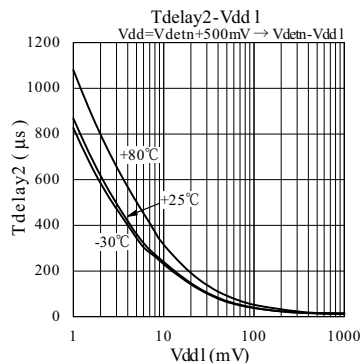
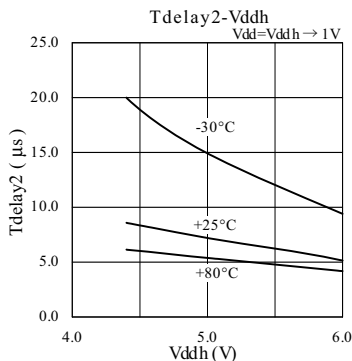
- $V_{detn}=3.4V$  (ELM7634xxB)



- $V_{detn}=4.0V$  (ELM7640xxB)



- $V_{detn}=4.4V$  (ELM7644xxB)



- $V_{detn}=4.8V$  (ELM7648xxB)

