ELM77xxxB CMOS Dual voltage detector

■General description

ELM77xxxB is CMOS dual voltage detector which consists of two comparator circuits watching Vdd level and Vdet input level simultaneously and independently. With internal power-on control circuit, when Vdd level is below 1.3V, the output of Vdet comparator of ELM77 series will be forced to "L". For ELM77 series, Vdetn1 is only available in 0.9V, 1.0V, 1.1V, 1.2V; the standard voltages of Vdetn2 are 2.2V, 2.4V, 2.5V, 2.7V; ELM77 series can also be made as semi-custom IC within the detection voltage range of 2.2V～2.7V of Vdetn2 by 0.1V step.

■Features

- Detection voltage range : Vdetn1 0.9V, 1.0V, 1.1V, 1.2V
  Vdetn2 2.2V, 2.4V, 2.5V, 2.7V (by 0.1V)
- Low voltage operation : Reset operation assured at 0.8V
- Low current consumption : Typ. 1.5μA (ELM77274B, Vdd=3.0V)
- Accuracy of detection voltage : Vdetn1 ±3.0%
  Vdetn2 ±2.5%
- Power on reset voltage : Typ. 1.3V
- Temperature coefficient : ±250ppm/℃
- Output form : N-ch opendrain
- Package : SOT-25

■Application

- Reset for microcomputers
- Power voltage shortage detectors
- Switch of backup power source
- Battery checkers

■Maximum absolute ratings

Parameter	Symbol	Limit	Unit
Power supply voltage	Vdd	10	V
Input voltage (for detection voltage)	Vdet	10	V
Output voltage	Vout1	Vss-0.3～+10	V
	Vout2		
Output current	Iout1	25	mA
	Iout2		
Power dissipation	Pd	300	mW
Operationg temperature	Top	-40～+85	℃
Storage temperature	Tstg	-55～+125	℃

■Selection guide

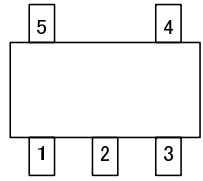
ELM77xxxB-x

Symbol		
a,b	Detection voltage2	e.g. : 22: Vdetn2=2.2V 24: Vdetn2=2.4V 25: Vdetn2=2.5V 27: Vdetn2=2.7V
c	Detection voltage1	e.g. : 1 : Vdetn1=0.9V 2 : Vdetn1=1.0V 3 : Vdetn1=1.1V 4 : Vdetn1=1.2V
d	Product version	B
e	Taping direction	S : Refer to PKG file N : Refer to PKG file

ELM77 x x x B - x
↑ ↑ ↑ ↑ ↑
a b c d e

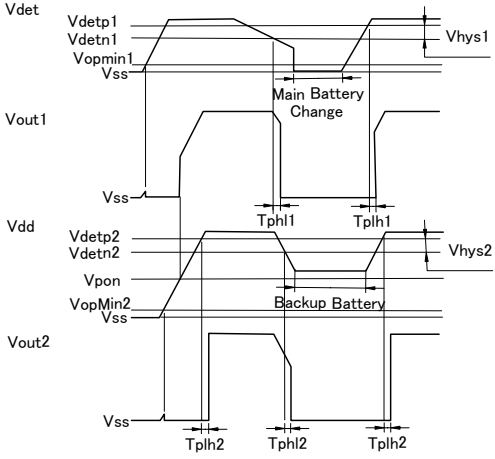
■Pin configuration

SOT-25 (TOP VIEW)

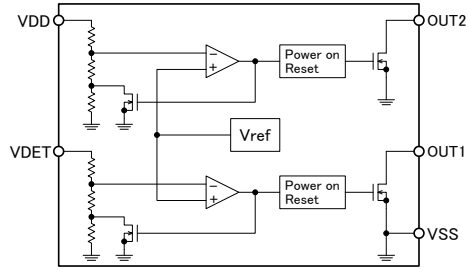


Pin No.	Pin name
1	OUT1
2	VDD
3	VSS
4	VDET
5	OUT2

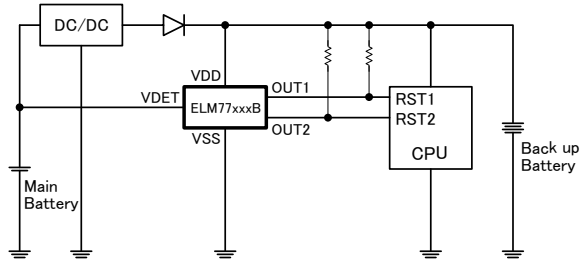
■Timing chart



■Block diagram



■e.g.) Circuit



■Electrical characteristics

ELM77221B Top=25℃

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Detection voltage1	Vdetn1	Vdd=1.5V, Pullup 3.0V, R=1MΩ	0.873	0.900	0.927	V	2
Detection voltage2	Vdetn2	Pullup 3.0V, R=1MΩ	2.145	2.200	2.255	V	2
Hysteresis width1	Vhys1			Vdetn1 ×0.03		V	2
Hysteresis width2	Vhys2			Vdetn2 ×0.05		V	2
Current consumption	Iss	Vdd=3.0V		2.0	6.0	μA	1
Power voltage	Vdd		0.8		6.0	V	2
Output current1	Ioutn1	Vdd=0.8V, Vds=0.5V	0.005	0.100		mA	3
Output current2	Ioutn2	Vdd=1.5V, Vds=0.5V	1.0	3.0		mA	3
Power on reset voltage	Vpon	*1	1.15	1.30	1.45	V	2
Input voltage (for detection voltage)	Vdet	1.5V≦Vdd	0		≦Vdd	V	4
Input current	Idet	Vdd=Vdet=1.5V		0.7		μA	4
Delay time1	Tphl1			0.4		ms	5-(1)
Delay time2	Tphl2			0.6		ms	5-(2)
Temperature characteristic of Vdetn	$\frac{\Delta Vdetn}{\Delta Top}$	Top=−40～+85℃		±250		ppm/℃	

* Note : test circuit No.
* 1 : Vdetn1 output is forced to "L" when or if Vdd is lower than Vpon voltage represent.

ELM77242B Top=25℃

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Detection voltage1	Vdetn1	Vdd=1.5V, Pullup 3.0V, R=1MΩ	0.970	1.000	1.030	V	2
Detection voltage2	Vdetn2	Pullup 3.0V, R=1MΩ	2.340	2.400	2.460	V	2
Hysteresis width1	Vhys1			Vdetn1 ×0.03		V	2
Hysteresis width2	Vhys2			Vdetn2 ×0.05		V	2
Current consumption	Iss	Vdd=3.0V		1.5	5.0	μA	1
Power voltage	Vdd		0.8		6.0	V	2
Output current1	Ioutn1	Vdd=0.8V, Vds=0.5V	0.005	0.100		mA	3
Output current2	Ioutn2	Vdd=1.5V, Vds=0.5V	1.0	3.0		mA	3
Power on reset voltage	Vpon	*1	1.15	1.30	1.45	V	2
Input voltage (for detection voltage)	Vdet	1.5V≦Vdd	0		≦Vdd	V	4
Input current	Idet	Vdd=Vdet=1.5V		0.7		μA	4
Delay time1	Tphl1			0.4		ms	5-(1)
Delay time2	Tphl2			0.6		ms	5-(2)
Temperature characteristic of Vdetn	$\frac{\Delta Vdetn}{\Delta Top}$	Top=−40～+85℃		±250		ppm/℃	

* Note : test circuit No.
* 1 : Vdetn1 output is forced to "L" when or if Vdd is lower than Vpon voltage represent.

ELM77253B Top=25℃

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Detection voltage1	Vdetn1	Vdd=1.5V, Pullup 3.0V, R=1MΩ	1.067	1.100	1.133	V	2
Detection voltage2	Vdetn2	Pullup 3.0V, R=1MΩ	2.437	2.500	2.563	V	2
Hysteresis width1	Vhys1			Vdetn1 ×0.03		V	2
Hysteresis width2	Vhys2			Vdetn2 ×0.05		V	2
Current consumption	Iss	Vdd=3.0V		1.5	5.0	μA	1
Power voltage	Vdd		0.8		6.0	V	2
Output current1	Ioutn1	Vdd=0.8V, Vds=0.5V	0.005	0.100		mA	3
Output current2	Ioutn2	Vdd=1.5V, Vds=0.5V	1.0	3.0		mA	3
Power on reset voltage	Vpon	*1	1.15	1.30	1.45	V	2
Input voltage (for detection voltage)	Vdet	1.5V≦Vdd	0		≦Vdd	V	4
Input current	Idet	Vdd=Vdet=1.5V		0.7		μA	4
Delay time1	Tphl1			0.4		ms	5-(1)
Delay time2	Tphl2			0.6		ms	5-(2)
Temperature characteristic of Vdetn	$\frac{\Delta Vdetn}{\Delta Top}$	Top=-40～+85℃		±250		ppm/℃	

* Note : test circuit No.
* 1 : Vdetn1 output is forced to "L" when or if Vdd is lower than Vpon voltage represent.

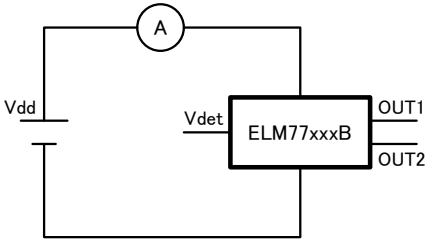
ELM77274B Top=25℃

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Detection voltage1	Vdetn1	Vdd=1.5V, Pullup 3.0V, R=1MΩ	1.164	1.200	1.236	V	2
Detection voltage2	Vdetn2	Pullup 3.0V, R=1MΩ	2.632	2.700	2.768	V	2
Hysteresis width1	Vhys1			Vdetn1 ×0.03		V	2
Hysteresis width2	Vhys2			Vdetn2 ×0.05		V	2
Current consumption	Iss	Vdd=3.0V		1.5	5.0	μA	1
Power voltage	Vdd		0.8		6.0	V	2
Output current1	Ioutn1	Vdd=0.8V, Vds=0.5V	0.005	0.100		mA	3
Output current2	Ioutn2	Vdd=1.5V, Vds=0.5V	1.0	3.0		mA	3
Power on reset voltage	Vpon	*1	1.15	1.30	1.45	V	2
Input voltage (for detection voltage)	Vdet	1.5V≦Vdd	0		≦Vdd	V	4
Input current	Idet	Vdd=Vdet=1.5V		0.7		μA	4
Delay time1	Tphl1			0.4		ms	5-(1)
Delay time2	Tphl2			0.6		ms	5-(2)
Temperature characteristic of Vdetn	$\frac{\Delta Vdetn}{\Delta Top}$	Top=-40～+85℃		±250		ppm/℃	

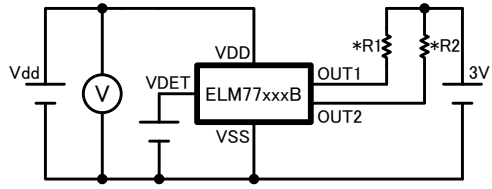
* Note : test circuit No.
* 1 : Vdetn1 output is forced to "L" when or if Vdd is lower than Vpon voltage represent.

■Test circuits

1) Current consumption

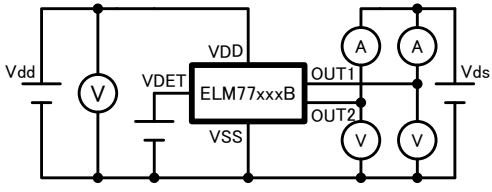


2) Detection voltage

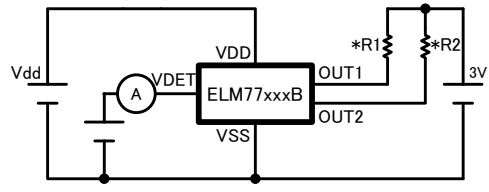


* R=1MΩ

3) Output current (N-ch)

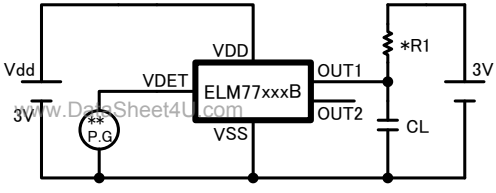


4) Input current



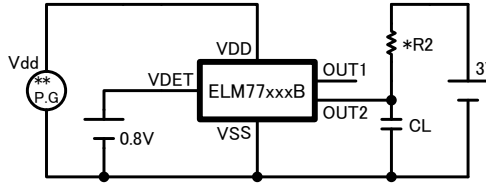
* R=1MΩ

5)-(1) Delay time (1)



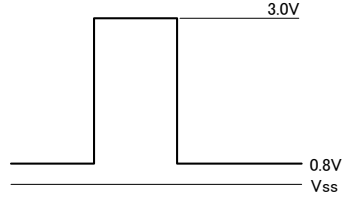
* R1=1MΩ

5)-(2) Delay time (2)



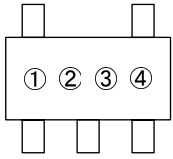
* R2=1MΩ

** Input pulse



■Marking

SOT-25



No. ① : the detection voltage1

Mark	Vdetn1	Mark	Vdetn1
A	0.9V	C	1.1V
B	1.0V	D	1.2V

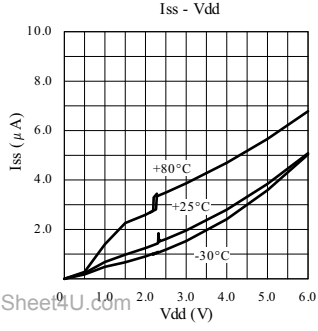
No. ② : the detection voltage2

Mark	Vdetn2	Mark	Vdetn2
2	2.2V	5	2.5V
3	2.3V	6	2.6V
4	2.4V	7	2.7V

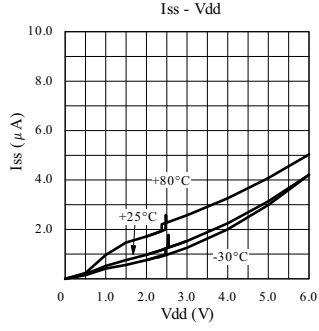
No. ③ : Assembly lot No.
A～Z (I, O, X excepted)
No. ④ : Assembly lot No.
0～9

■Current consumption characteristics

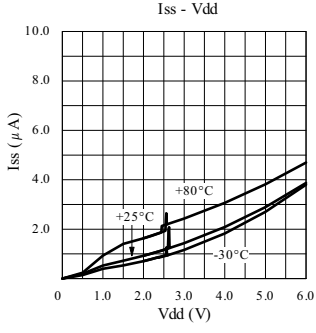
・ELM77221B



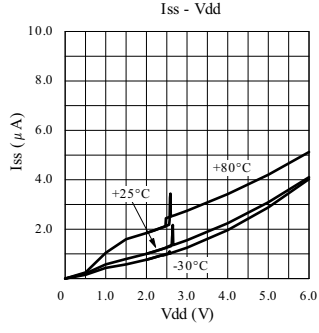
・ELM77242B



・ELM77253B

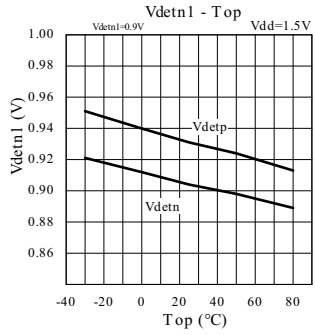


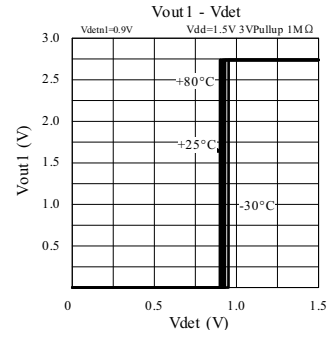
・ELM77274B



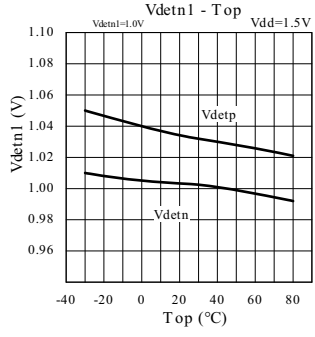
■Detection voltage characteristics (Vdetn1)

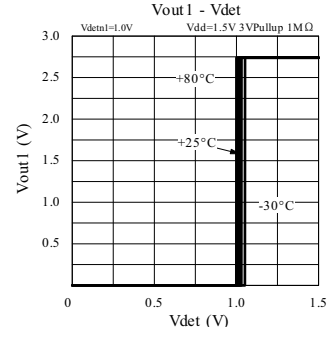
• ELM77xx1B



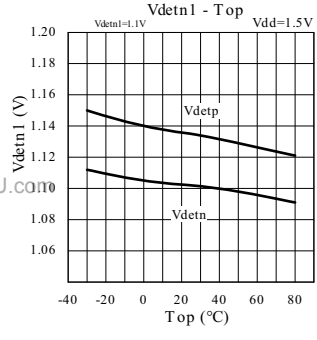


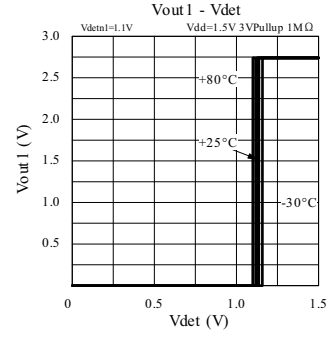
• ELM77xx2B



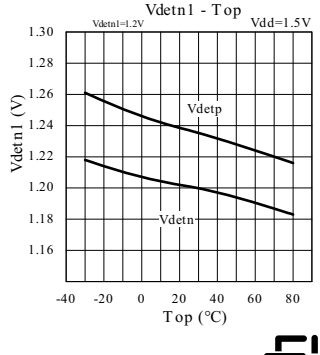


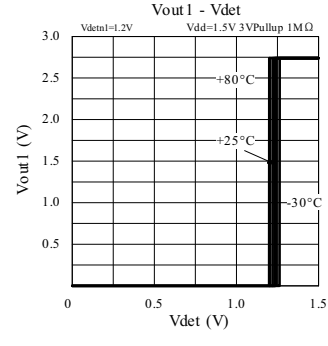
• ELM77xx3B





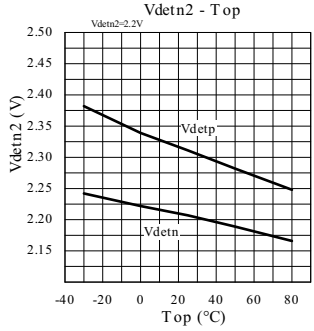
• ELM77xx4B

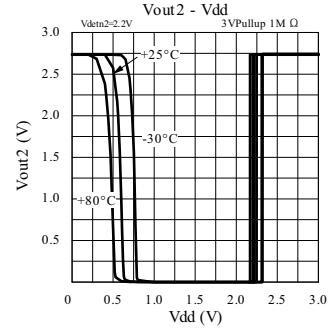




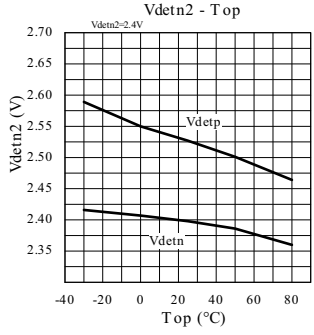
■Detection voltage characteristics (Vdetn2)

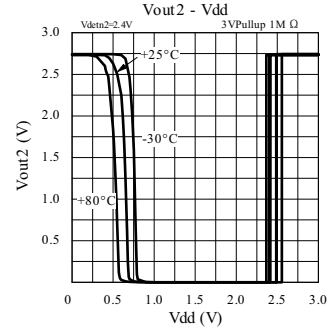
• ELM7722xB



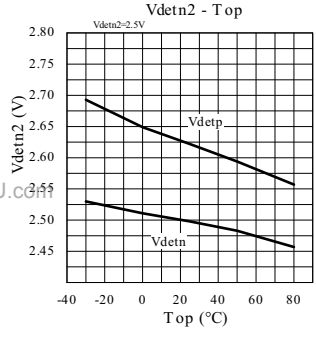


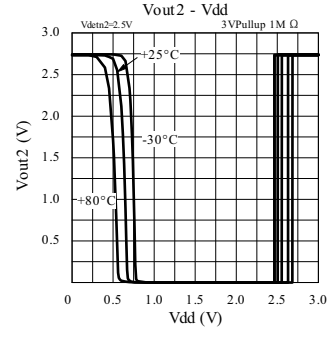
• ELM7724xB



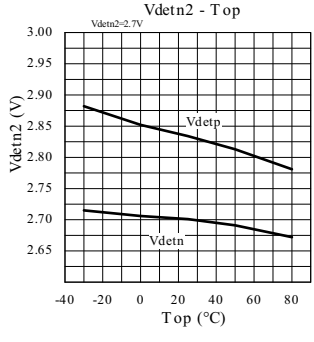


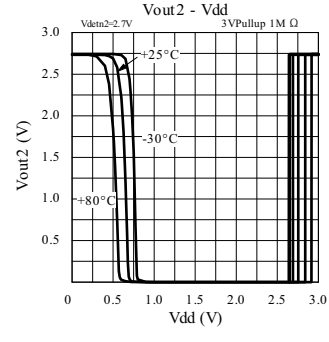
• ELM7725xB



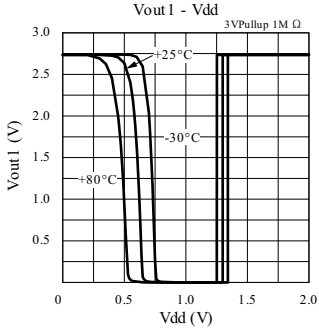


• ELM7727xB

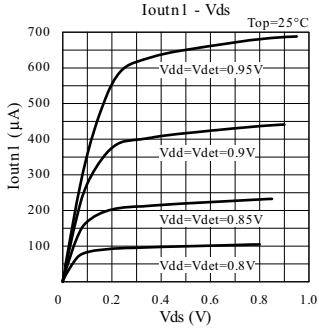


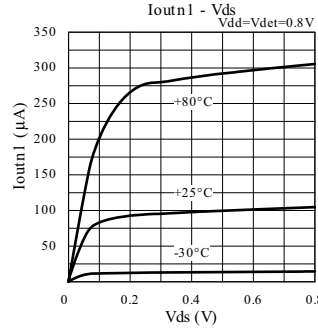


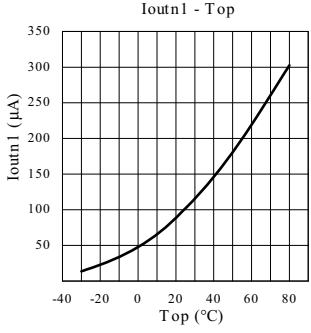
■Power on reset voltage



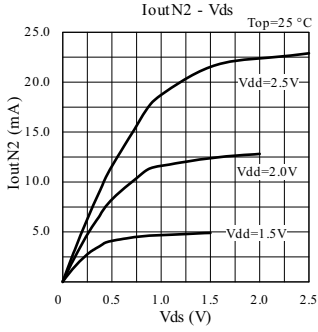
■Output current characteristics1 (Ioutn1)

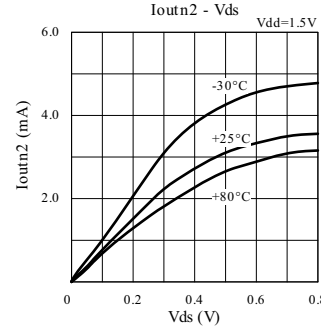


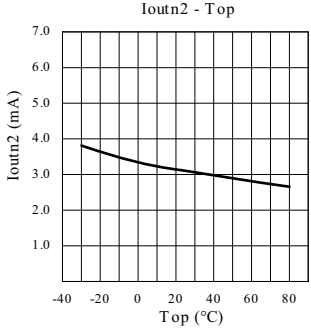




■Output current characteristics2 (Ioutn2)

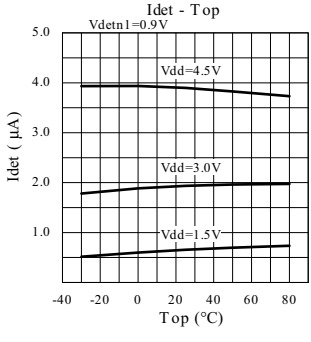




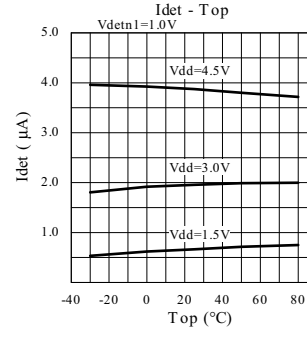


■Input current characteristics

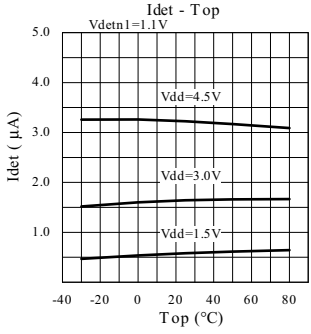
・ELM77xx1B



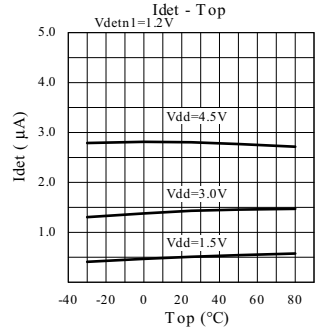
・ELM77xx2B



・ELM77xx3B



・ELM77xx4B



■Propagation delay time characteristics