2ch High voltage Reset IC with separated sense pin

PST122 Series

Overview

This IC is a 40V withstand voltage 2ch voltage detection IC that is ideal for monitoring the voltage of car batteries. The voltage detection accuracy is ± 2% including temperature fluctuation, and the output form is Nch open drain output.
The current consumption is 2.7 μA (typ.), And the operating temperature range is -40 to 105 ° C.

Features

- High withstand voltage
- High accuracy detection
- Low current consumption
- Hysteresis voltage selectable (0.1V to 4.0V)
- 2ch detect
- Separated sense pin
- No delay time

Main specifications

- Absolute maximum rating : -0.3V to 40V
- Operating voltage : 2.7V to 20V
- Operating ambient temperature : -40℃ to 105℃
- Detection voltage : 5.0V to 10.0V (0.1V step)
- Detection voltage accuracy : ±2% (Ta=-40to 105℃)
- Hysteresis voltage : 0.1V to 4.0V
- Consumption current : PST122A:Typ. 2.7uA (VDD=3.3V, VS1=VS2=16V)
  PST122B:Typ. 3.0uA (VDD=3.3V, VS1=VS2=16V)
  PST122C:Typ. 3.0uA (VDD=3.3V, VS1=VS2=16V)
  PST122D:Typ. 3.7uA (VDD=3.3V, VS1=VS2=16V)
- Output type : Open drain
- Output Logic : PST122A: Ch1 Active L / Ch2 Active L
  PST122B: Ch1 Active L / Ch2 Active H
  PST122C: Ch1 Active H / Ch2 Active L
  PST122D: Ch1 Active H / Ch2 Active H
- Additional function : Separated sense pin

Packages

- SOT-26B

Application

- Voltage monitor for car battery
- Voltage monitor for AC / DC converter output voltage

Mitsumi Electric CO.,LTD.
Semiconductor Business Division
Strategy Engineering Department
tel:+81-46-230-3470
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■ The details listed here are not a guarantee of the individual products at the time of ordering. When using the products, you will be asked to check their specifications.

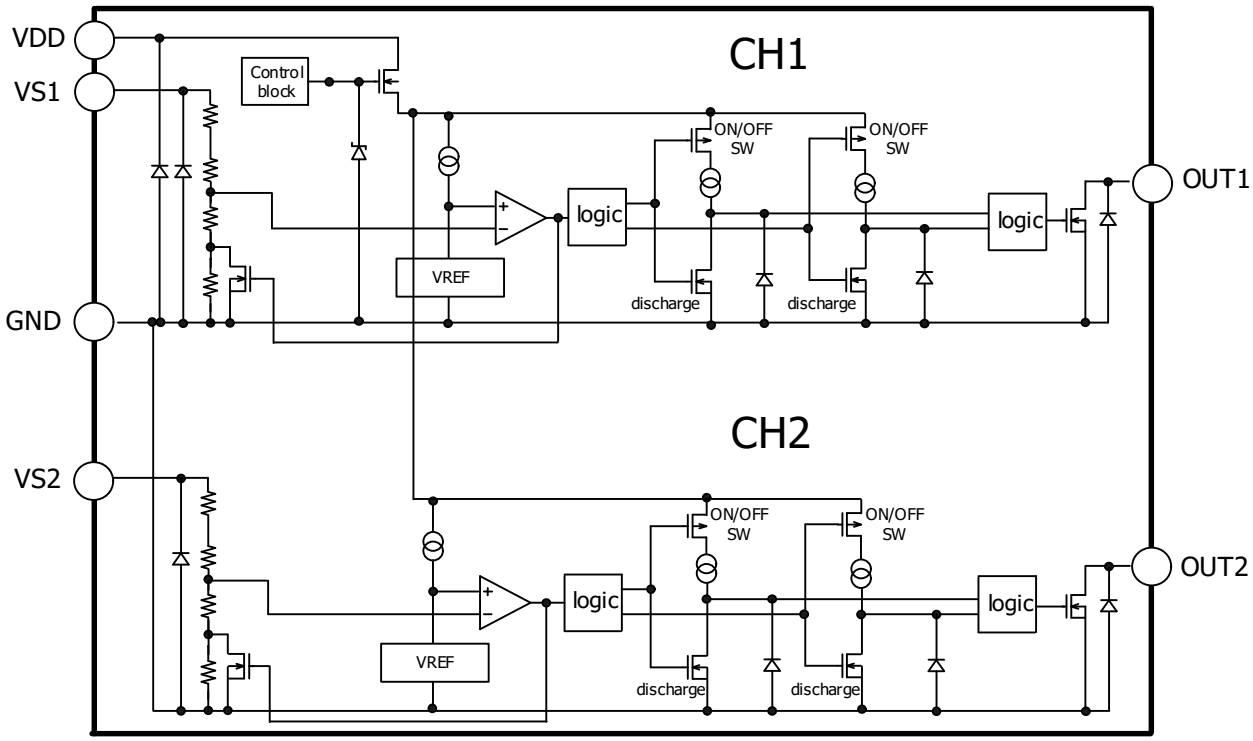
Model Name

P S T 1 2 2 X X X X X X

Series name (A) (B) (C) (D) (E)

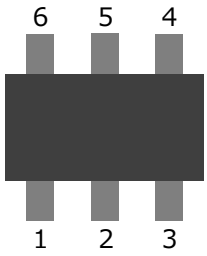
(A)	Function Type	A	Reset output logic Ch1 Active L / Ch2 Active L
		B	Reset output logic Ch1 Active L / Ch2 Active H
		C	Reset output logic Ch1 Active H / Ch2 Active L
		D	Reset output logic Ch1 Active H / Ch2 Active H
(B)	Reset detection voltage and Hysteresis voltage	01	2-digit alphanumerical serial number.
		≀	Detection voltage 5V~10V / Hysteresis voltage 0.1V~4.0V
(C)	Package	N	SOT-26B
(D)	Packing specifications 1	R	R housing (Standard)
(E)	Packing specifications 2	H	Embos tape / Halogen free

Block Diagram



Pin Configuration

- SOT-26B



Top view

Pin No.	Pin name	Function
1	VS2	Ch2 Voltage sensing pin
2	OUT2	Ch2 Output pin
3	VS1	Ch1 Voltage sensing pin
4	VDD	Power supply input pin
5	GND	Ground pin
6	OUT1	Ch1 Output pin

Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Supply voltage	VDD	-0.3	40	V
VS1 pin voltage	VS1	-0.3	40	V
VS2 pin voltage	VS2	-0.3	40	V
OUT1 pin voltage	VOUT1	-0.3	40	V
OUT2 pin voltage	VOUT2	-0.3	40	V
OUT1 pin output current	IOUT1	-	20	mA
OUT2 pin output current	IOUT2	-	20	mA
Storage temperature	Tstg	-55	150	℃
Power dissipation	Pd1	-	150	mW

Recommended Operating Conditions

Item	Symbol	Min.	Max.	Unit
Operating ambient temperature	Topr	-40	105	℃
Operating voltage	Vop	2.7	20	V

Electrical Characteristics

(Ta=-40~105°C, typically value at VDD=3.3V, Ta=25°C, unless otherwise specified *Note1)

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit	Test circuit
Consumption current	IDD	VDD=3.3V VS1=16V VS2=16V	PST122A	-	2.7	4.0	μA	B
			PST122B PST122C	-	3	5.1	μA	B
			PST122D	-	3.7	5.1	μA	B
CH1 Output current	IOL1	VDD=3.3V VS1=0V, VOUT1=0.5V	PST122A PST122B	1	-	-	mA	C
		VDD=3.3V VS1=20V, VOUT1=0.5V	PST122C PST122D	1	-	-	mA	C
CH2 Output current	IOL2	VDD=3.3V VS2=0V, VOUT2=0.5V	PST122A PST122C	1	-	-	mA	C
		VDD=3.3V VS2=20V, VOUT2=0.5V	PST122B PST122D	1	-	-	mA	C
CH1 Output leakage current	ILEAK1	VDD=20V VS1=20V, VOUT1=20V	PST122A PST122B	-	-	2	μA	C
		VDD=20V VS1=0V, VOUT1=20V	PST122C PST122D	-	-	2	μA	C
CH2 Output leakage current	ILEAK2	VDD=20V VS2=20V, VOUT2=20V	PST122A PST122C	-	-	2	μA	C
		VDD=20V VS2=0V, VOUT2=20V	PST122B PST122D	-	-	2	μA	C

*Note1:Final inspection is tested Ta=25°C only. Temperature ranges other than 25 °C is guaranteed by design.

Electrical Characteristics

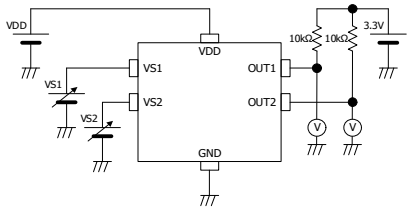
(Ta=-40~105°C, typically value at VDD=3.3V, Ta=25°C, unless otherwise specified *Note1)

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit	Test circuit
CH1 Reset transfer delay time	TdHLC1	VDD=3.3V VS1=13V→0V		30	-	200	μs	D
CH2 Reset transfer delay time	TdHLC2	VDD=3.3V VS2=13V→0V		30	-	200	μs	D
CH1 Release transfer delay time	TdLHC1	VDD=3.3V VS1=0V→13V		15	-	150	μs	D
CH2 Release transfer delay time	TdLHC2	VDD=3.3V VS2=0V→13V		15	-	150	μs	D
VS1 pin resistance	RVS1	VDD=3.3V VS1=14V		15	-	100	MΩ	E
VS2 pin resistance	RVS2	VDD=3.3V VS2=14V		15	-	100	MΩ	E
CH1 Reset voltage	VTH1	VDD=3.3V VS1:H→L		VTH1 × 0.98	VTH1	VTH1 × 1.02	V	A
CH1 Hysteresis voltage	ΔVTH1	VDD=3.3V ΔVTH1=VRE1-VTH1		-	ΔVTH1	-	V	A
CH1 Release voltage	VRE1	VDD=3.3V VS1:L→H	Δ VTH1<0.1V	VTH1×0.98 + (ΔVTH1-0.1)	VTH1 + ΔVTH1	VTH1×1.02 + (ΔVTH1+0.1)	V	A
			ΔVTH1≧ 0.1V	VTH1×0.98 + (ΔVTH1*0.9)	VTH1 + ΔVTH1	VTH1×1.02 + (ΔVTH1*1.1)	V	A
CH2 Reset voltage	VTH2	VDD=3.3V VS1:H→L		VTH2 × 0.98	VTH2	VTH2 × 1.02	V	A
CH2 Hysteresis voltage	ΔVTH2	VDD=3.3V ΔVTH2=VRE2-VTH2		-	ΔVTH2	-	V	A
CH2 Release voltage	VRE2	VDD=3.3V VS1:L→H	Δ VTH2<0.1V	VTH2×0.98 + (ΔVTH2-0.1)	VTH2 + ΔVTH2	VTH2×1.02 + (ΔVTH2+0.1)	V	A
			ΔVTH2≧ 0.1V	VTH2×0.98 + (ΔVTH2*0.9)	VTH2 + ΔVTH2	VTH2×1.02 + (ΔVTH2*1.1)	V	A

*Note1:Final inspection is tested Ta=25°C only. Temperature ranges other than 25 °C is guaranteed by design.

Test Circuit

(A)



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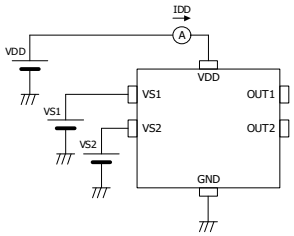

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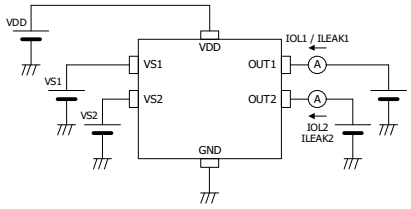

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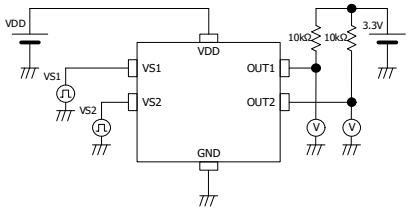

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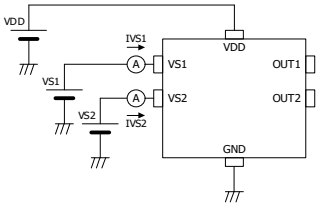
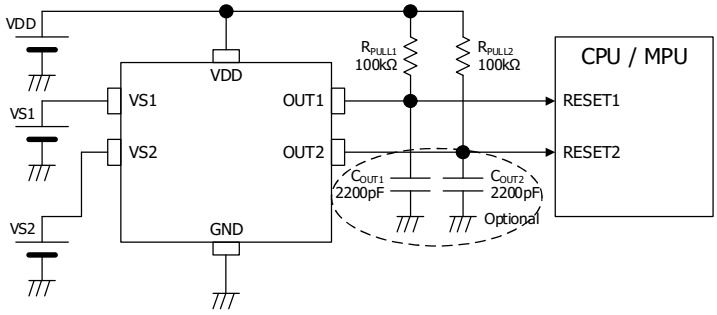


Application Circuit



Note

1. The typical application circuit is not guaranteed for a set applications. It has to test sufficiently in a set applications.

2. In the event a problem which may affect industrial property or any other rights of us or a third party is encountered during the use of information described in these circuit, Mitsumi shall not be liable for any such problem, nor grant a license therefore.

3. For Surge and over voltage protection, recommend to use ESD protection device such as baristor at battery pin (ex. VDD, VS1, VS2).

4. If the hysteresis voltage is small, the OUT1 and OUT2 pins may chatter. It is recommended to connect a about 2200pF capacitor to the OUT1 and OUT2 pins to prevent chattering.

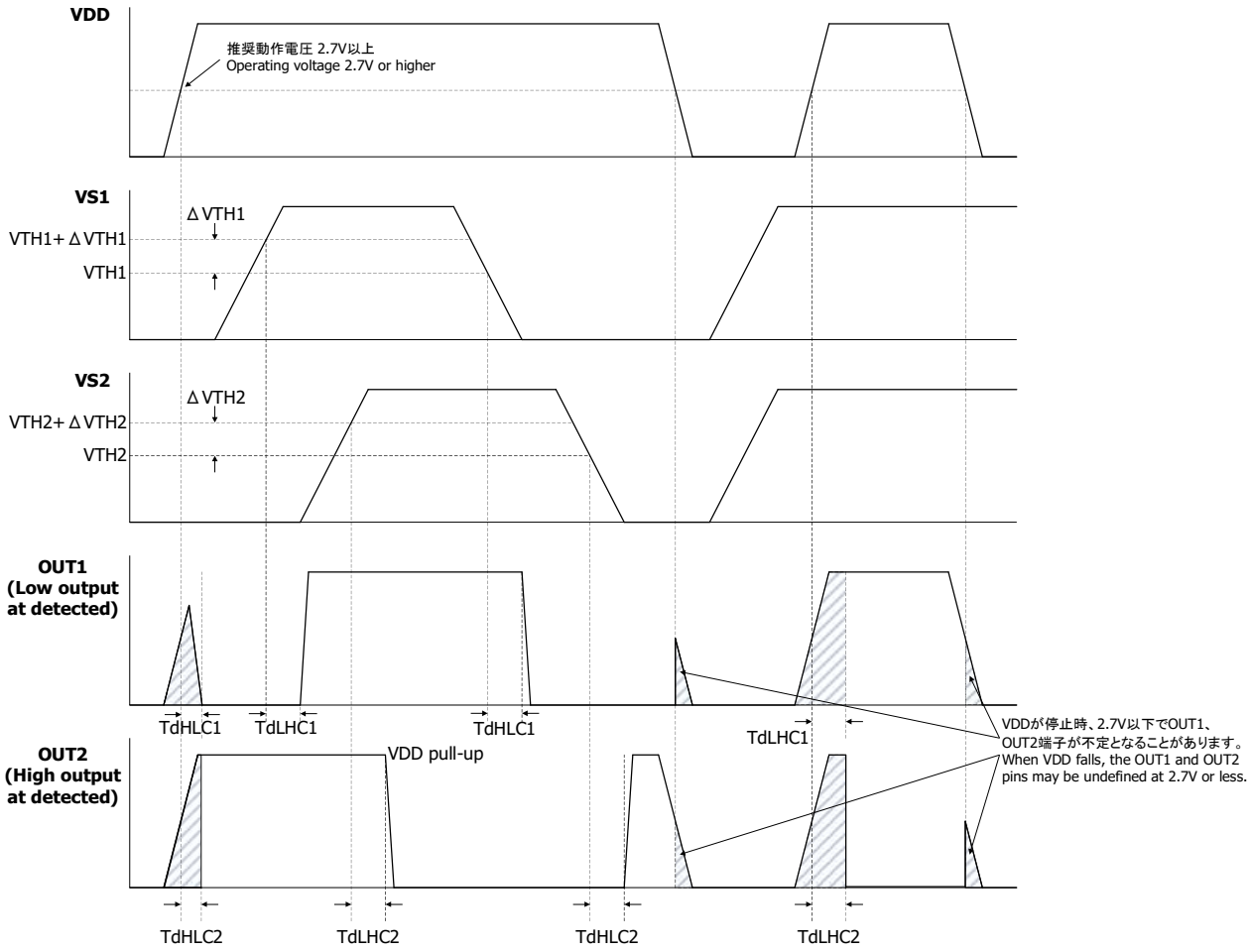
5. At VDD start-up, the output may be undifiend during the transfer delay. After VDD exceeds 2.7V, It is recommended to set the output to wait during reset and release transfer delay time. When VDD falls, the OUT1 and OUT2 pins may be undefined at 2.7V or less.

6. Between next to each other pin of PST1xx (SOT-26B), it has parasitic capacitance due to Package and IC round, max 0.2pF . Because of next to VS pin and OUT pin, when it happened VS pin voltage is changing rapidly, it afferd between pin, it happened over / under shoot.
   To decrease of over / under shoot ,it recommend to connect the capacitor COUT at OUT pin.
   When it may have parasitic capacitance to OUT pin round at set board, it improves layout pattern, separating from changing rapidly node or adding shield of ground.

Timing Chart

- PST122BxxNxx

ch1 Active L output / ch2 Active H output



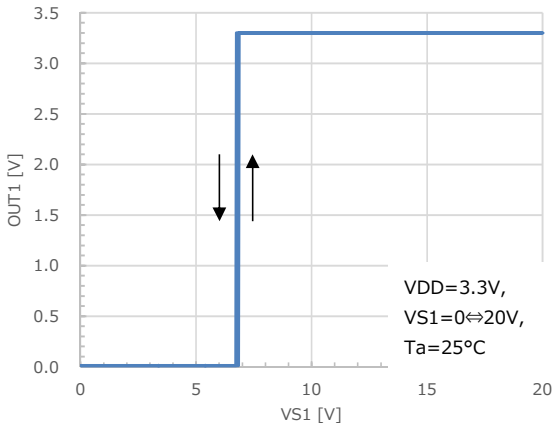
VDDが2.7Vを越えてから、OUT1、OUT2端子が検出状態になるまでの時間は最大で検出伝達遅延時間TdHLC1、TdHLC2、になります。
また、この期間、OUT1、OUT2端子が不定となることがあります。
The time from when VDD exceeds 2.7V to when the OUT1 and OUT2 pins transition to the detection state is detection transfer delay time TdHLC1 and TdHLC2.
The OUT1 and OUT2 pins may be undefined during this period.

VDDが2.7Vを越えてから、OUT1、OUT2が解除状態になるまでの時間は最大で解除遅延時間TdLHC1、TdLHC2になります。また、この期間、OUT端子が不定となることがあります。
The time from when VDD exceeds 2.7V to when the OUT1 and OUT2 pins transition to the release state is release transfer delay time TdLHC1 and TdLHC2.
The OUT1 and OUT2 pins may be undefined during this period.

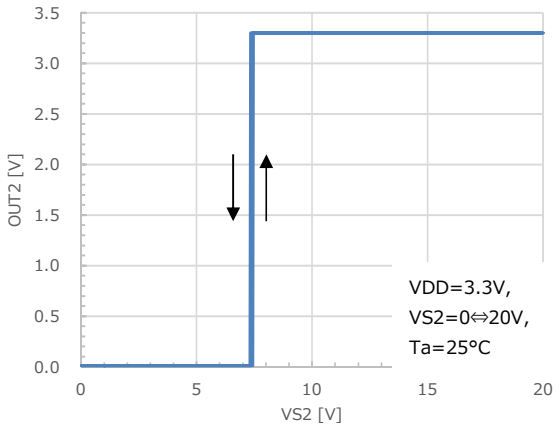
Typical Performance Characteristics

PST122A04N : VTH1=6.667V, ΔVTH1=0.1V
VTH2=7.477V, ΔVTH2=0.1V

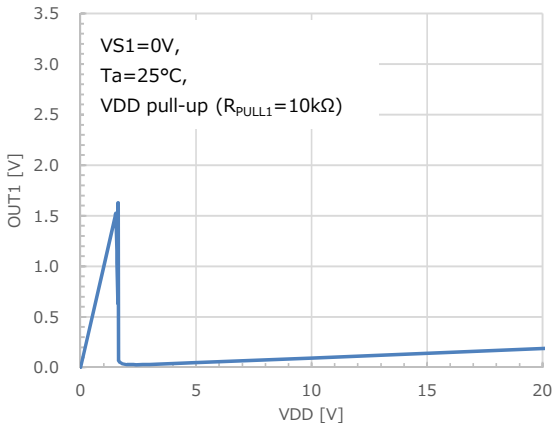
■ CH1 reset voltage - VS1



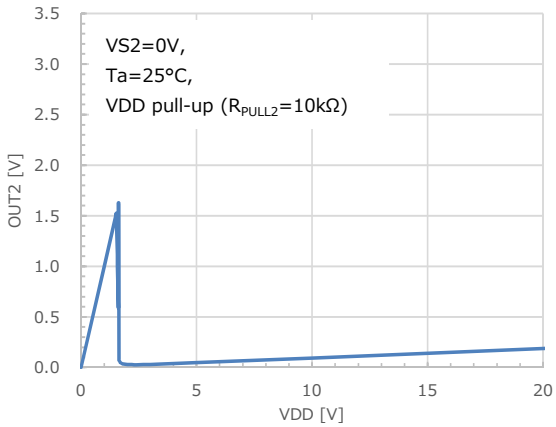
■ CH2 reset voltage - VS2



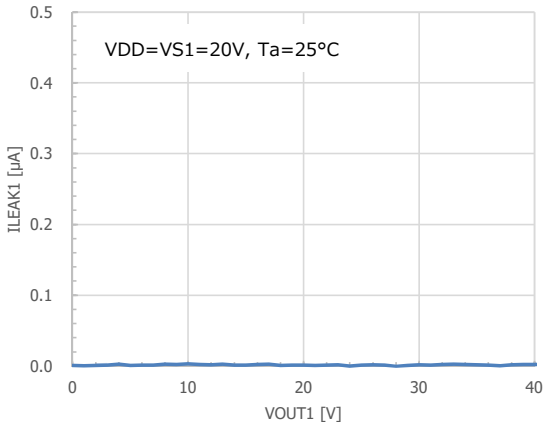
■ OUT1 pin voltage - VDD



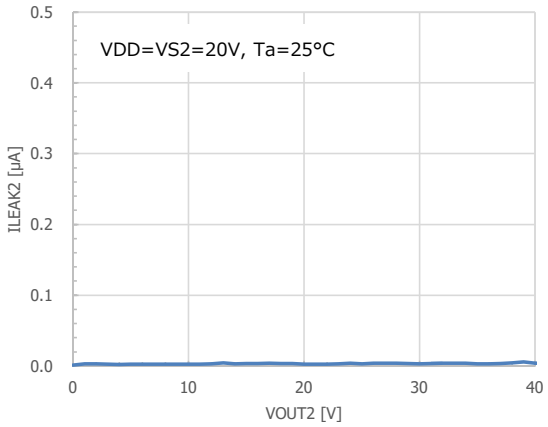
■ OUT2 pin voltage - VDD



■ CH1 reset voltage - VS1



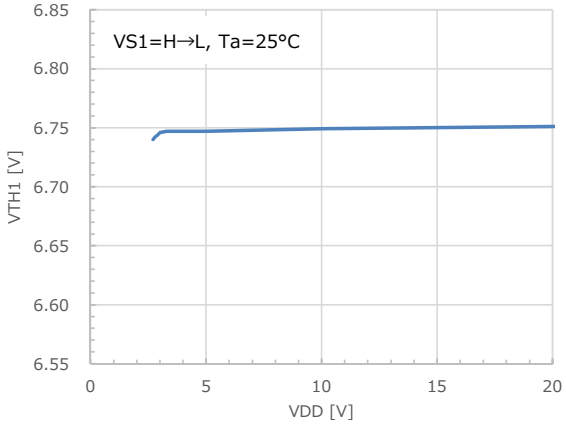
■ CH2 reset voltage - VS2



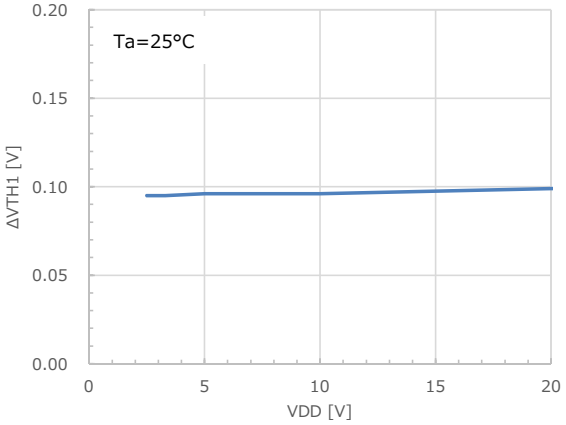
Typical Performance Characteristics

PST122A04N : VTH1=6.667V, ΔVTH1=0.1V
VTH2=7.477V, ΔVTH2=0.1V

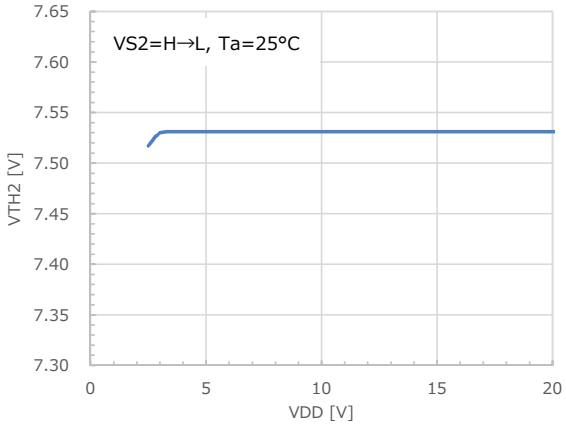
■ CH1 reset voltage -VDD



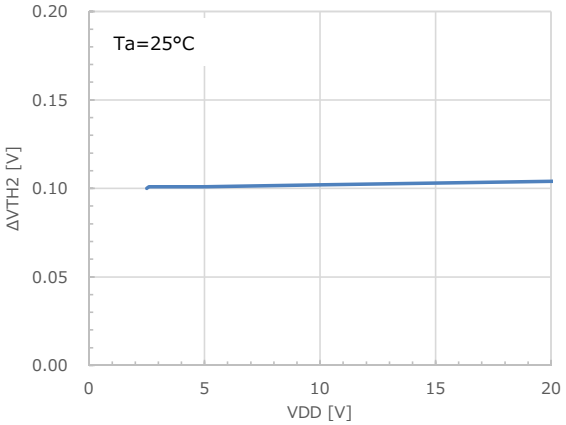
■ CH1 hysteresis voltage



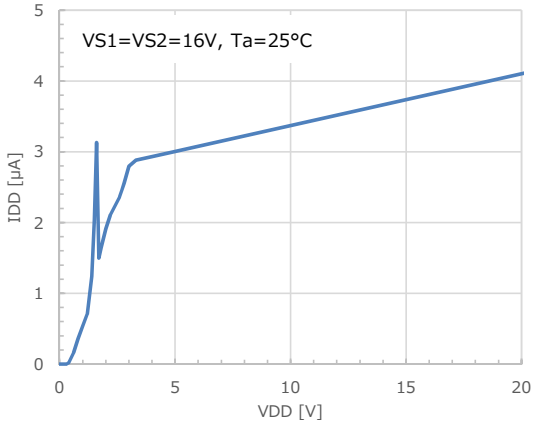
■ CH2 reset voltage -VDD



■ CH2 hysteresis voltage



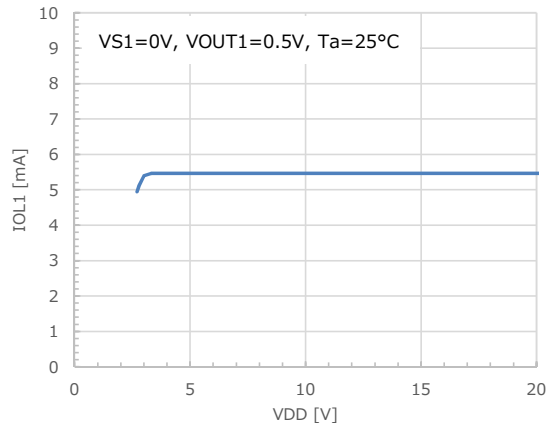
■ Supply current - VDD



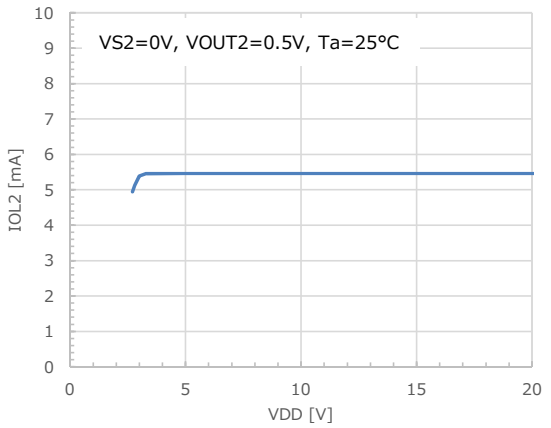
Typical Performance Characteristics

PST122A04N : VTH1=6.667V, ΔVTH1=0.1V
VTH2=7.477V, ΔVTH2=0.1V

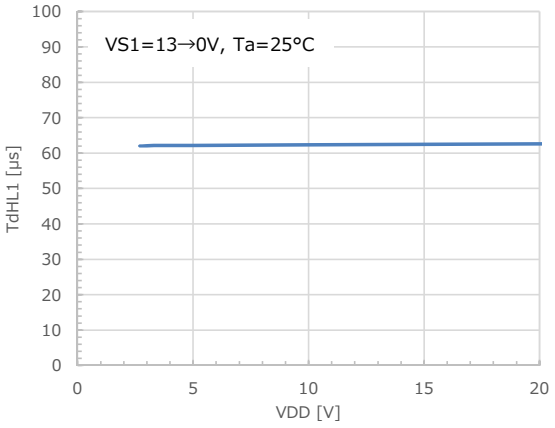
- CH1 output current - VDD



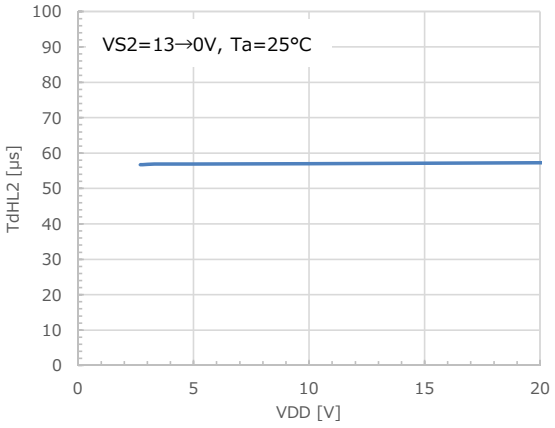
- CH2 output current - VDD



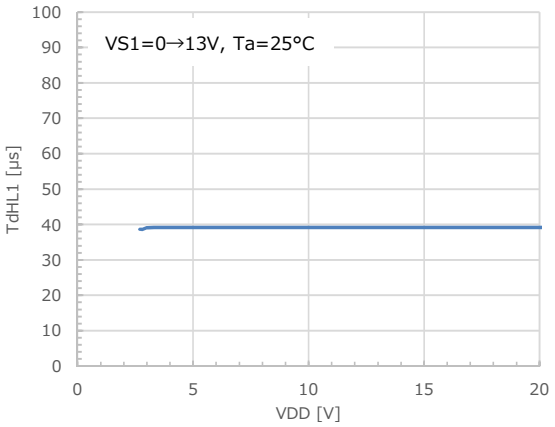
- CH1 reset transfer delay time - VDD



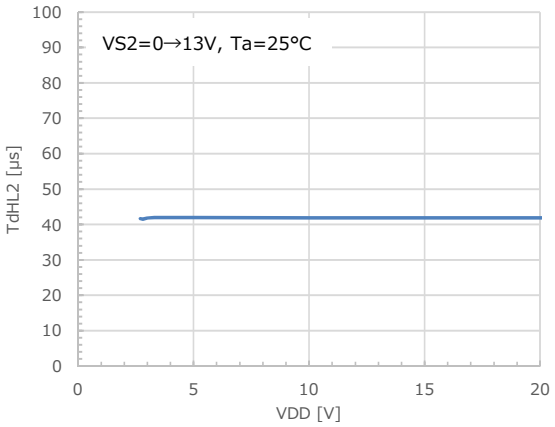
- CH2 reset transfer delay time - VDD



- CH1 release transfer delay time - VDD



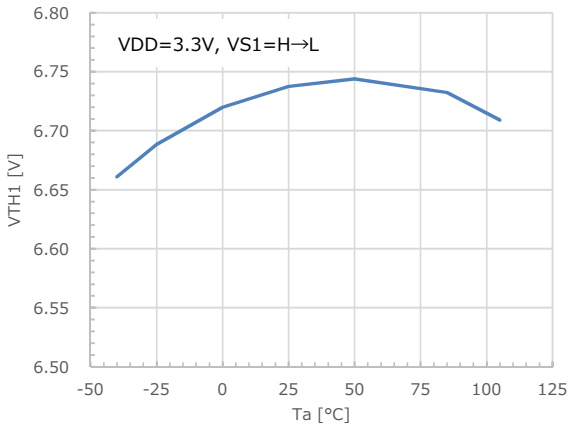
- CH2 release transfer delay time - VDD



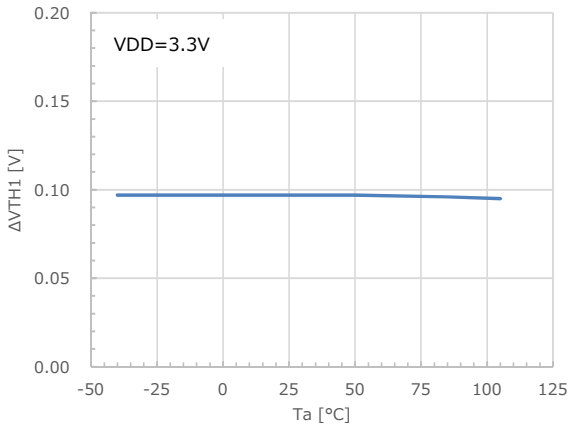
Typical Performance Characteristics

PST122A04N : VTH1=6.667V, ΔVTH1=0.1V
VTH2=7.477V, ΔVTH2=0.1V

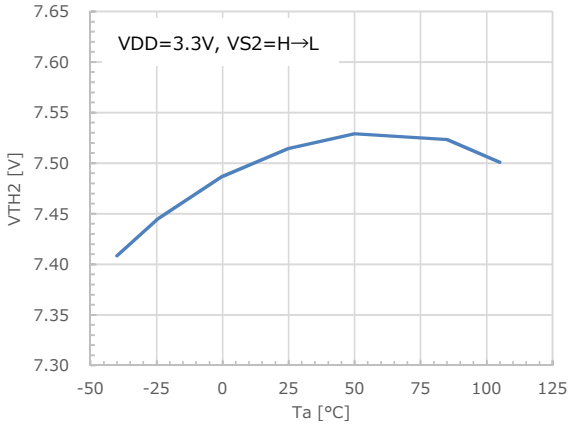
■ CH1 reset voltage - Temperature



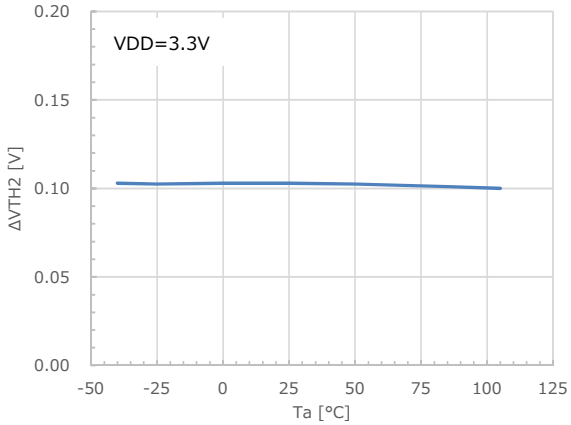
■ CH1 hysteresis voltage - Temperature



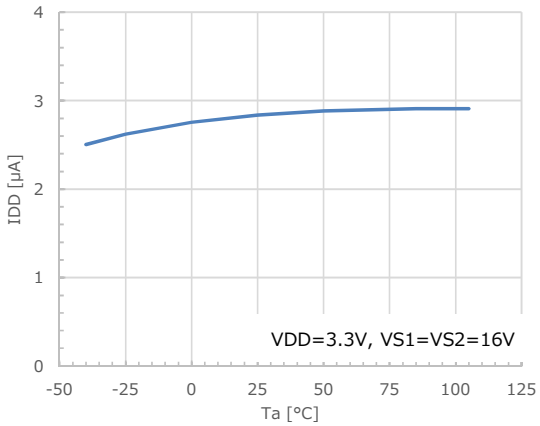
■ CH2 reset voltage - Temperature



■ CH2 hysteresis voltage - Temperature



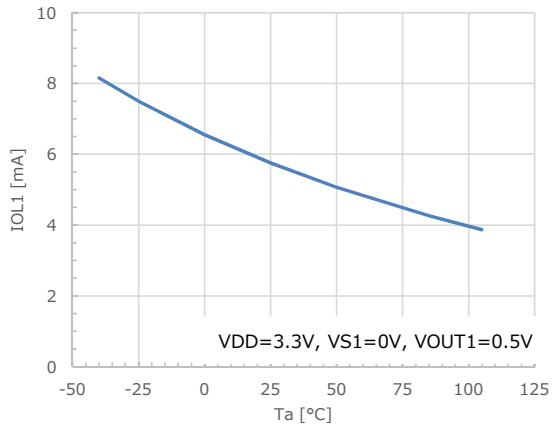
■ Supply current - Temperature



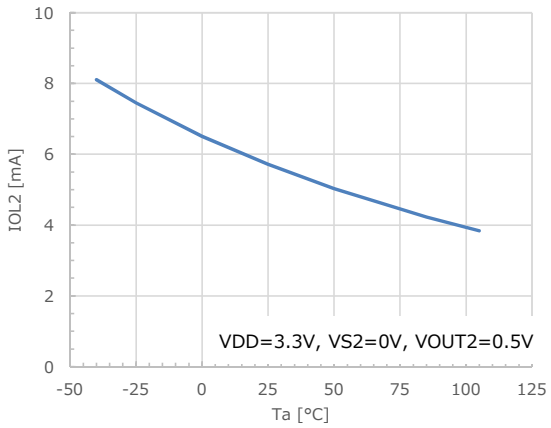
Typical Performance Characteristics

PST122A04N : VTH1=6.667V, ΔVTH1=0.1V
VTH2=7.477V, ΔVTH2=0.1V

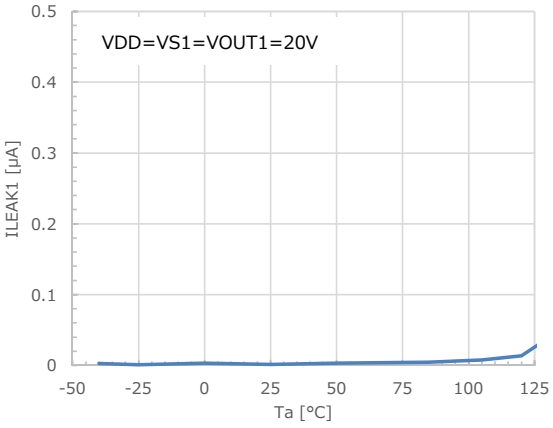
■ CH1 output current - Temperature



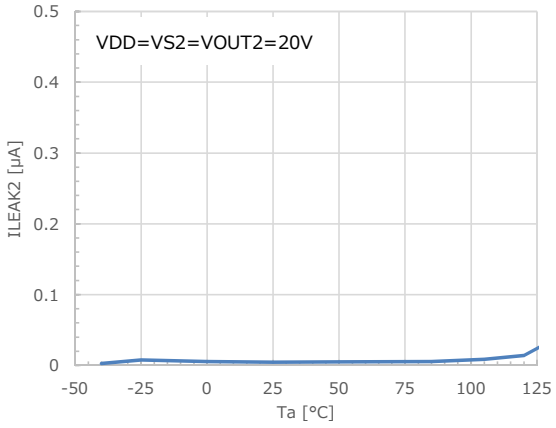
■ CH2 output current - Temperature



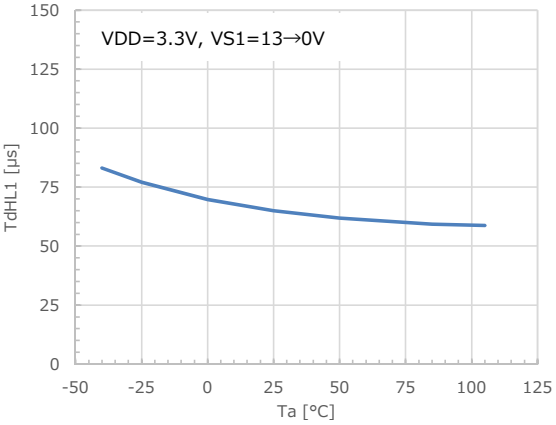
■ CH1 output leakage current - Temperature



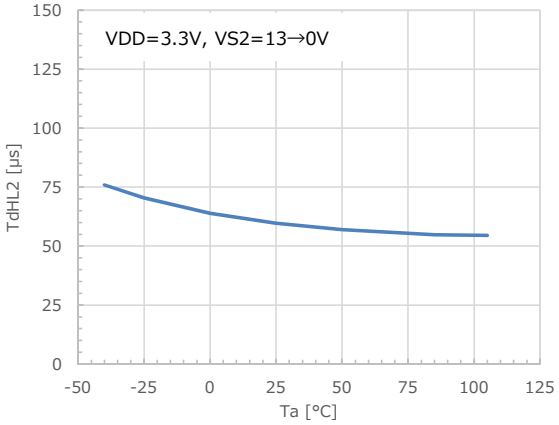
■ CH2 output leakage current - Temperature



■ CH1 reset transfer delay time - Temperature



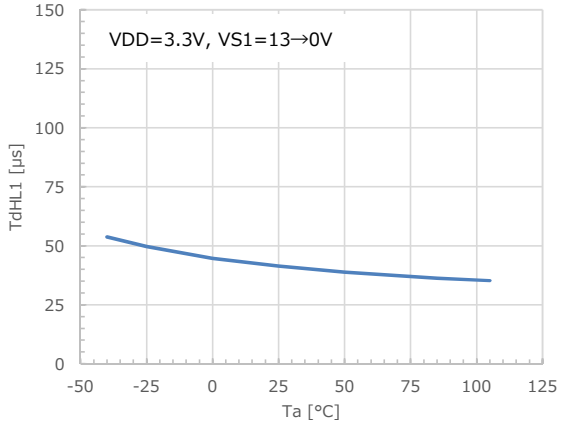
■ CH2 reset transfer delay time - Temperature



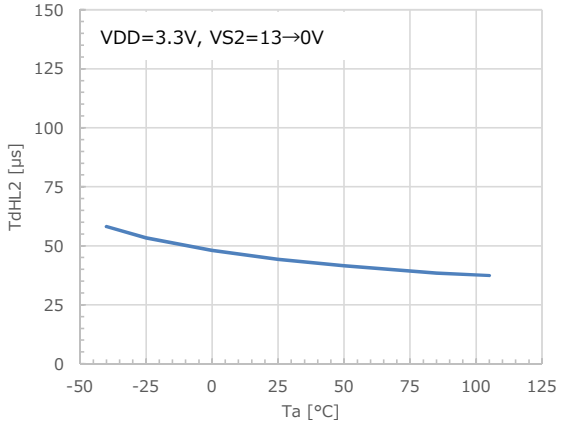
Typical Performance Characteristics

PST122A04N : VTH1=6.667V, ΔVTH1=0.1V
VTH2=7.477V, ΔVTH2=0.1V

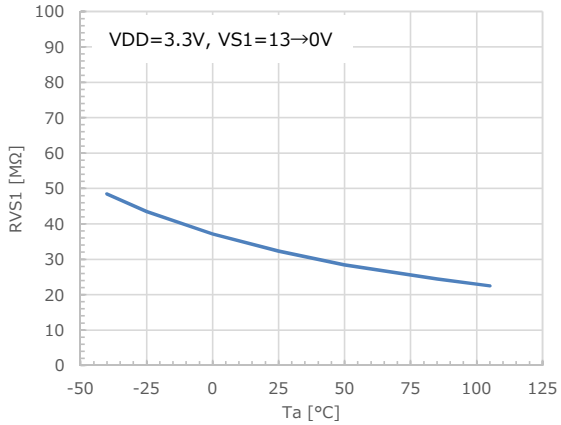
■ CH1 release transfer delay time - Temperature



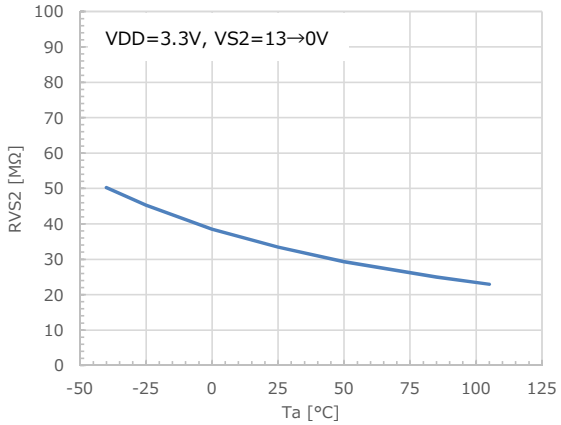
■ CH2 release transfer delay time - Temperature



■ VS1 pin resistance - Temperature

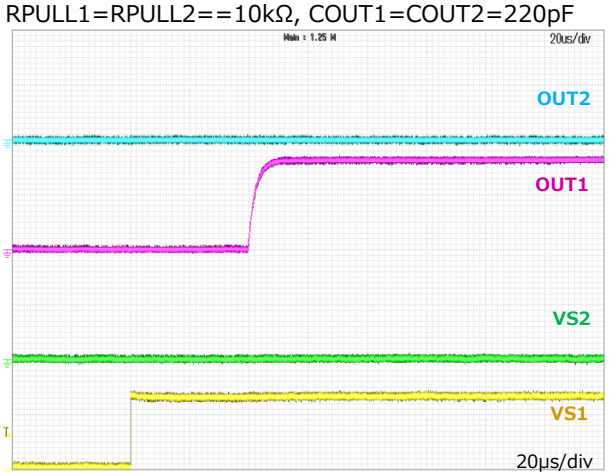


■ VS2 pin resistance - Temperature



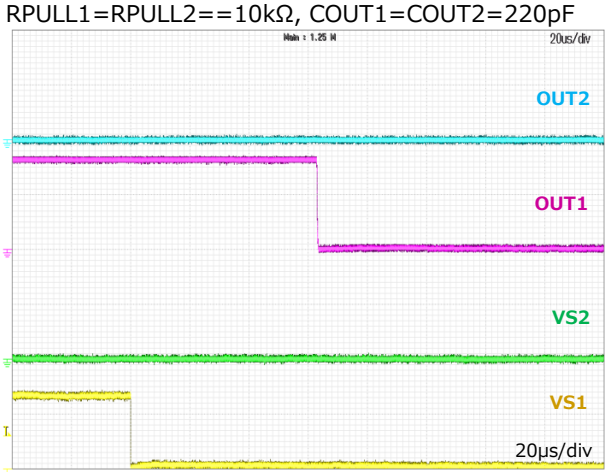
■ Waveform (VS1 rising)

VDD=3.3V, VS1=0→13V, VS2=0V, Ta=25°C
RPULL1=RPULL2==10kΩ, COUT1=COUT2=220pF



■ Waveform (VS1 falling)

VDD=3.3V, VS1=13→0V, VS2=0V, Ta=25°C
RPULL1=RPULL2==10kΩ, COUT1=COUT2=220pF

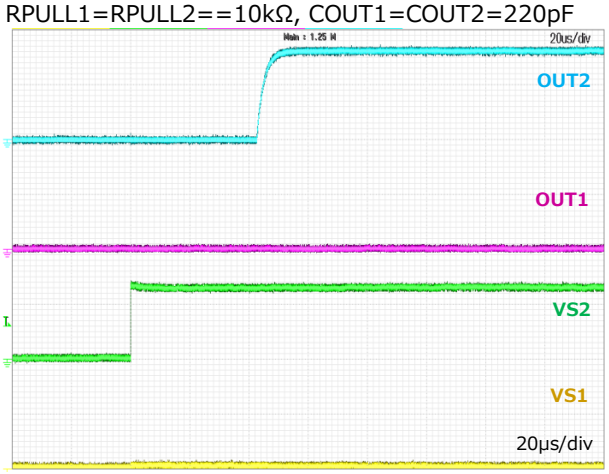


Typical Performance Characteristics

PST122A04N : VTH1=6.667V, ΔVTH1=0.1V
VTH2=7.477V, ΔVTH2=0.1V

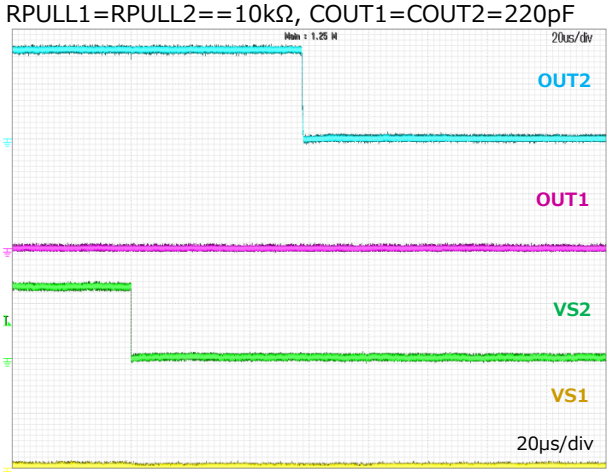
■ Waveform (VS2 rising)

VDD=3.3V, VS1=0V, VS2=0→13V, Ta=25°C
RPULL1=RPULL2==10kΩ, COUT1=COUT2=220pF



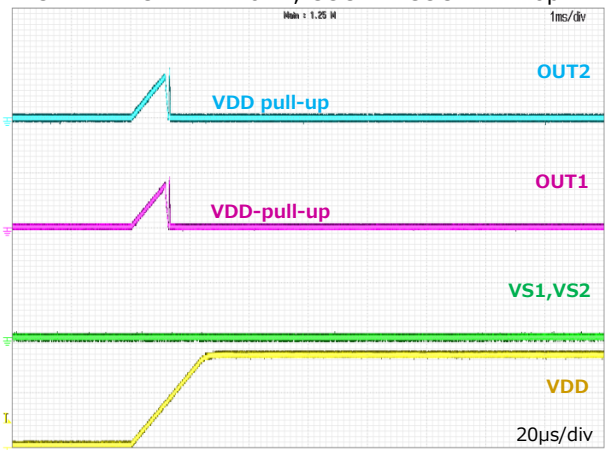
■ Waveform (VS2 falling)

VDD=3.3V, VS1=0V, VS2=13→0V, Ta=25°C
RPULL1=RPULL2==10kΩ, COUT1=COUT2=220pF



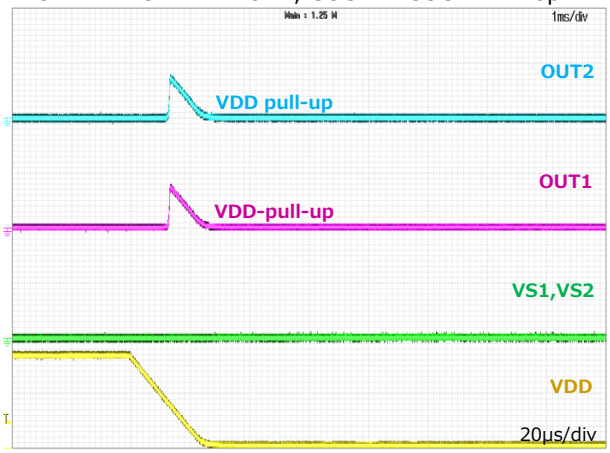
■ Waveform (VDD rising VS1=VS2=0V)

VDD=0→3.3V, VS1=VS2=0V, Ta=25°C
RPULL1=RPULL2==10kΩ, COUT1=COUT2=220pF



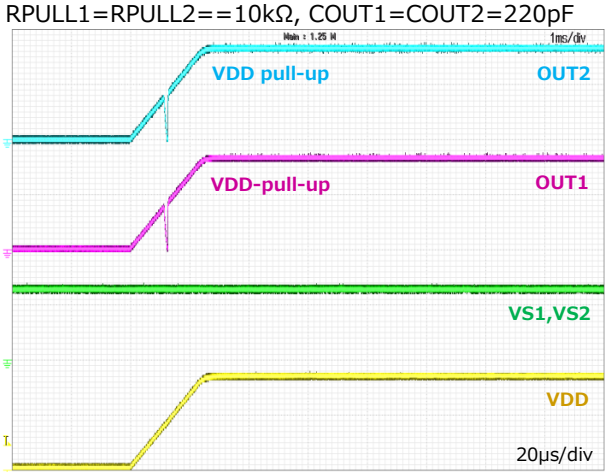
■ Waveform (VDD falling VS1=VS2=0V)

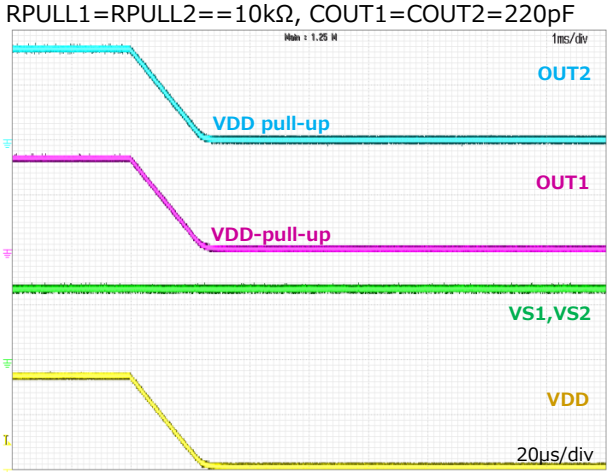
VDD=3.3→0V, VS1=VS2=0V, Ta=25°C
RPULL1=RPULL2==10kΩ, COUT1=COUT2=220pF



■ Waveform (VDD rising VS1=VS2=13V)

VDD=3.3→0V, VS1=VS2=13V, Ta=25°C
RPULL1=RPULL2==10kΩ, COUT1=COUT2=220pF



■ Waveform (VDD falling VS1=VS2=13V)

VDD=0→3.3V, VS1=VS2=13V, Ta=25°C
RPULL1=RPULL2==10kΩ, COUT1=COUT2=220pF