SIGNAL LEVEL SENSOR SYSTEM

■ GENERAL DESCRIPTION

The **NJU7181** is a signal level sensor system IC. It sends a High flag to the microprocessor or other equipments whenever it detects the existence of the audio signal.

The **NJU7181** includes a delay circuit which allows the IC continue to hold the flag after the absence of the audio signal. This holding time can be adjusted with external capacitor.

Together with its adjustable Input Sensitivity *(by external resistor)* & its characteristic of low current consumption and low operating voltage, **NJU7181** is suitable for Eco-Design of Energy-using Products and for battery operated applications.

■ PACKAGE OUTLINE

NJU7181RB1
MSOP8 (TVSP8)

NJU7181KU1

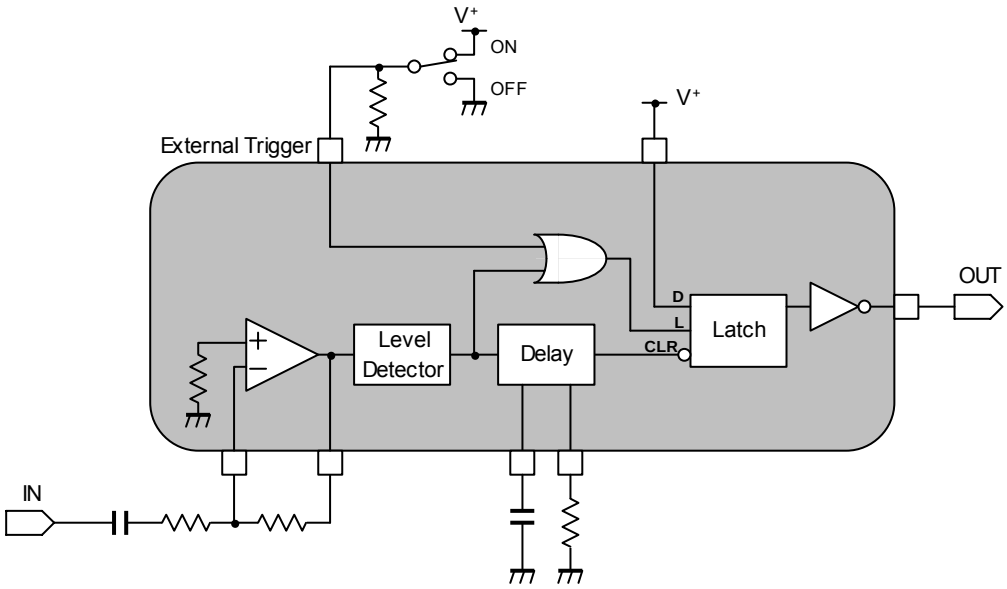
■ FEATURES

- Operating Voltage 0.9 to 5.5V
- Low Operating Current 55μA typ.
- Delay circuit for long Recovery time
- Adjustable Recovery time by external capacitor
- Adjustable Input Sensitivity by external resistance
- C-MOS Technology
- Package Outline MSOP8 (TVSP8)*
  ESON8
  *MEET JEDEC MO-187-DA / THIN TYPE

■ APPLICATIONS

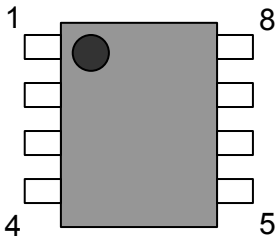
- Power Saving for battery operated devices
- Muting Application
- Memory saving for recording devices
- Half- duplex transmission application

■ BLOCK DIAGRAM

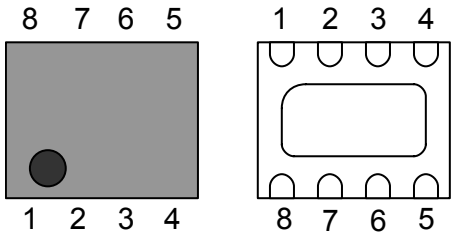


■ **PIN CONFIGURATION**

MSOP8 (TVSP8)



ESON8



Surface **Backside**

No.	Symbol	Function
1	IN	AC Input
2	AMP_OUT	Amplifier Output
3	TRIN	External Trigger Input
4	GND	Ground
5	CAP_D	Delay Time Capacitor
6	RES_D	Delay Time Resister
7	OUT	DC Output
8	V^+	Supply Voltage

■ **ABSOLUTE MAXIMUM RATING** (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+	+7	V
Power Dissipation	P_D	MSOP8 (TVSP8): 470 (Note1) ESON8: 450	mW
Maximum Input Voltage	V_{IMAX}	0 ~ V^+ (Note2)	V
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-40 ~ +125	°C

(Note1) EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting
(Note2) Don't put Input Voltage more than Power Supply Voltage.

■ **ELECTRICAL CHARACTERISTICS**

(Ta=25°C, V^+=3V, R_1=10kΩ, R_2=100kΩ, R_d=220kΩ, C_d=10nF)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+		0.9	-	5.5	V
Operating Current	I_{DD}	No signal, R_L=∞	-	55	100	μA
Input Sensitivity	V_{INS}	f=1kHz	-45	-41.5	-38	dBV
Delay Time 1	T_{delay1}		1.0	1.5	2.0	Sec
Delay Time 2	T_{delay2}	V^+=0.9V	1.0	1.5	2.0	Sec
Delay Time 3	T_{delay3}	C_d =10μF	-	1,500	-	Sec

■ **DC CHARACTERISTICS**

DC Output Terminal (7pin)

(Ta=25°C)

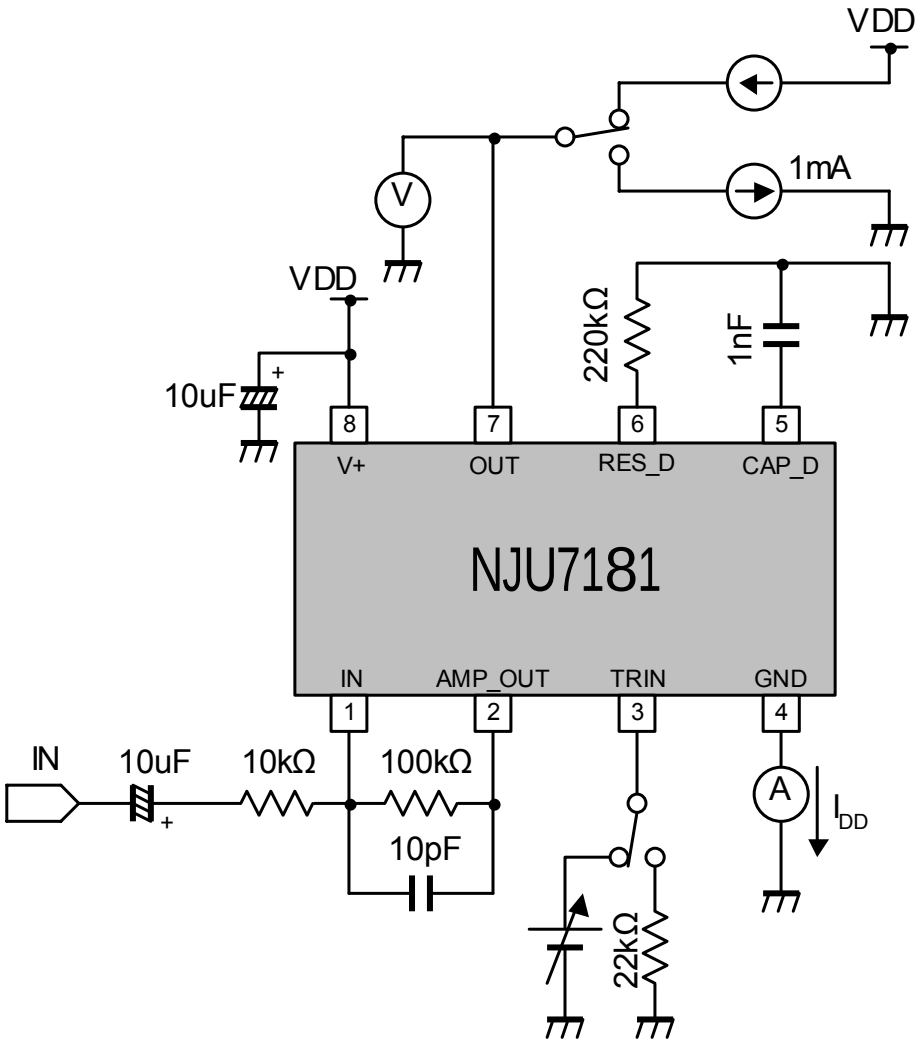
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
High Level Output Voltage	V_{OH}	I_{SOURCE} =1mA	V^+-0.2	-	V^+	V
Low Level Output Voltage	V_{OL}	I_{SINK} =1mA	0	-	0.2	V

External Trigger Switch Terminal (3pin)

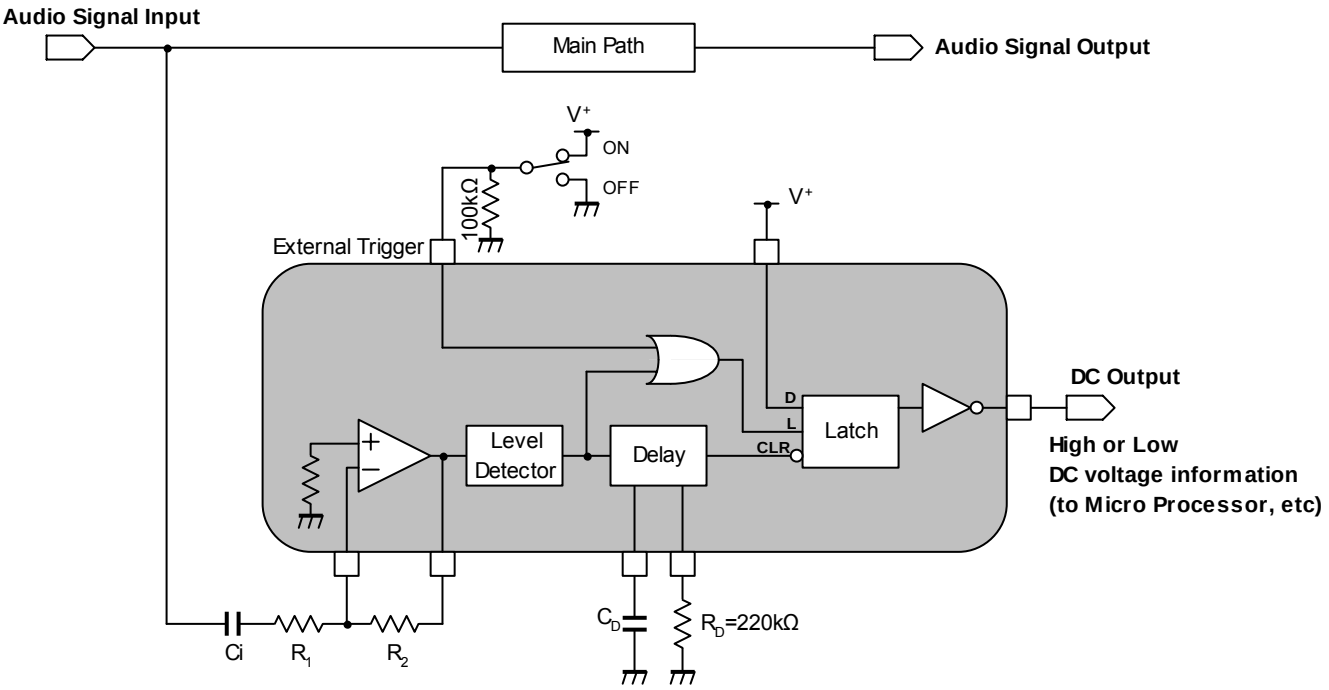
(Ta=25°C)

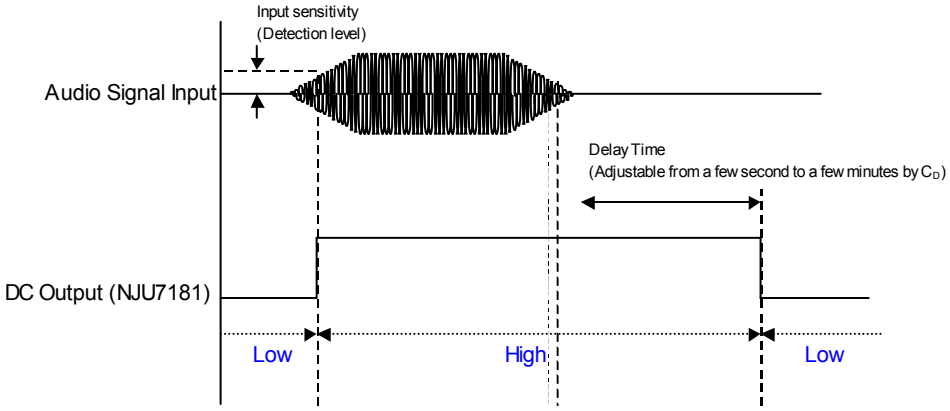
High Level Input Voltage	V_{IH}		V^+-0.2	-	V^+	V
Low Level Input Voltage	V_{IL}		0	-	0.2	V

■ **TEST CIRCUIT**

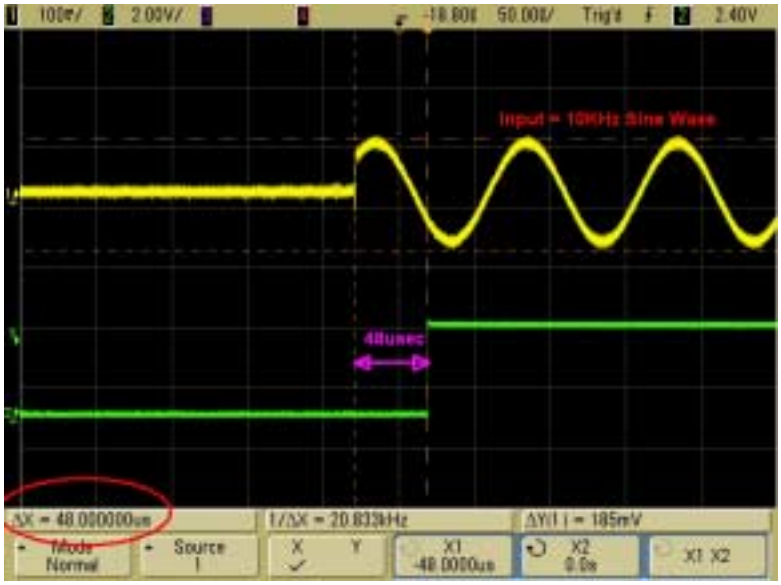


■ APPLICATION CIRCUIT

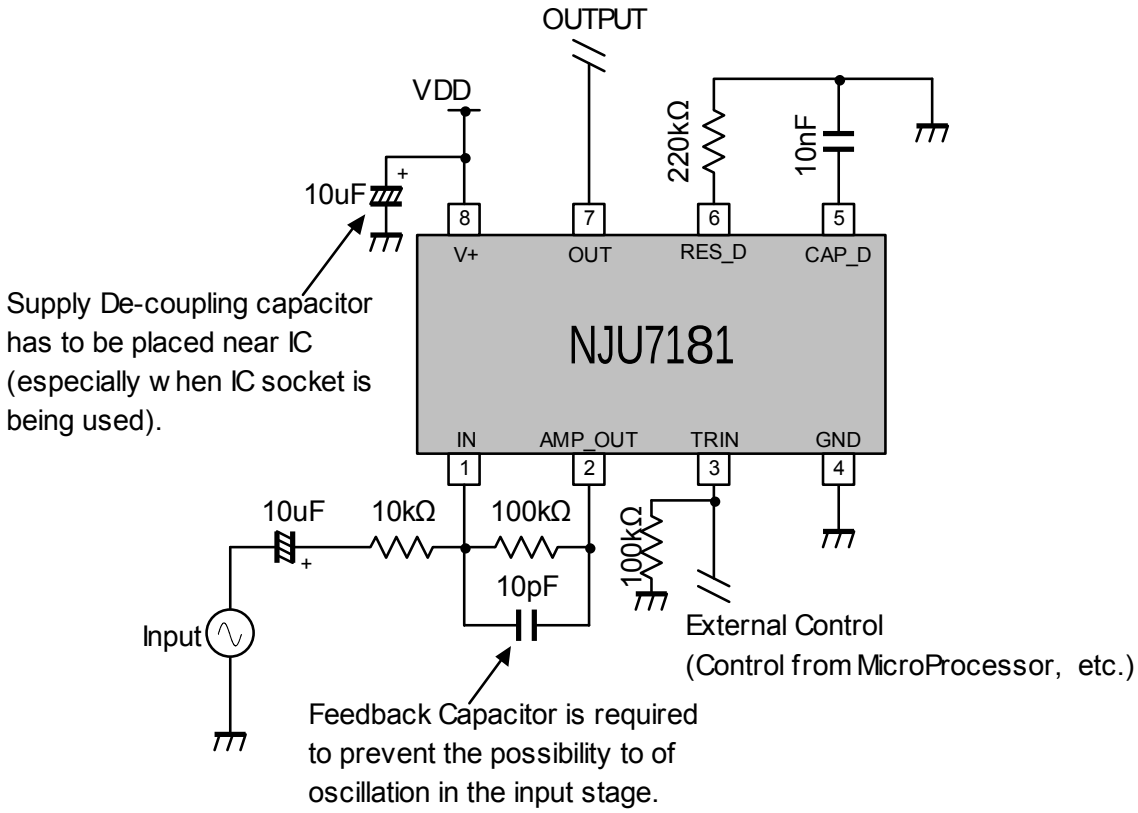




Attack Time:



Note:

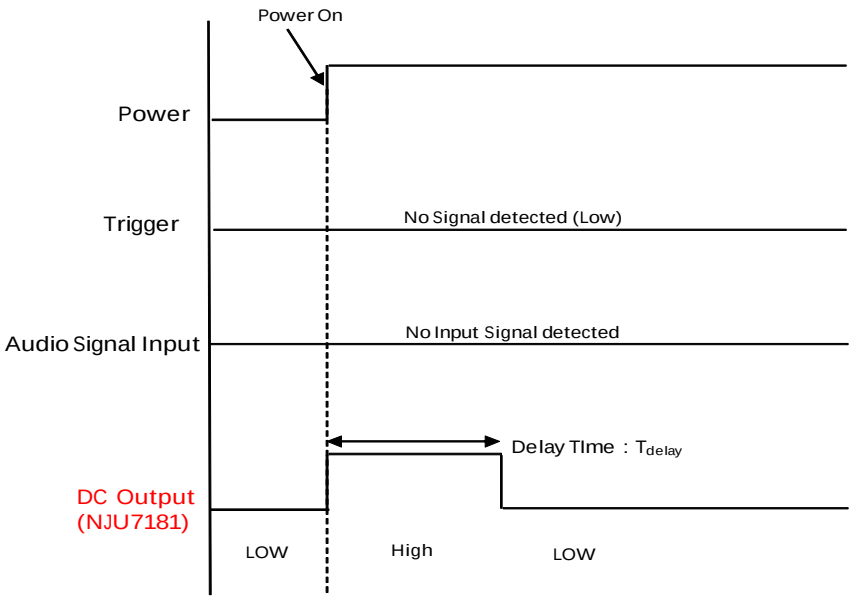


■ APPLICATION NOTE

- **DC Output Waveform Scenario**

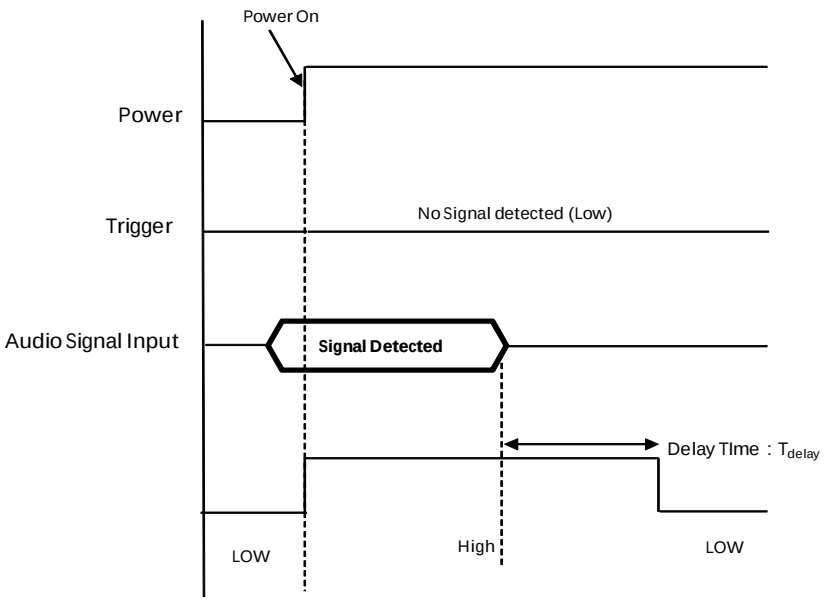
Scenario 1: Power-ON
– Output will be high initially when NJU7181 is first powered up even if there is no input signal detected.

POWER ON with no signal detected



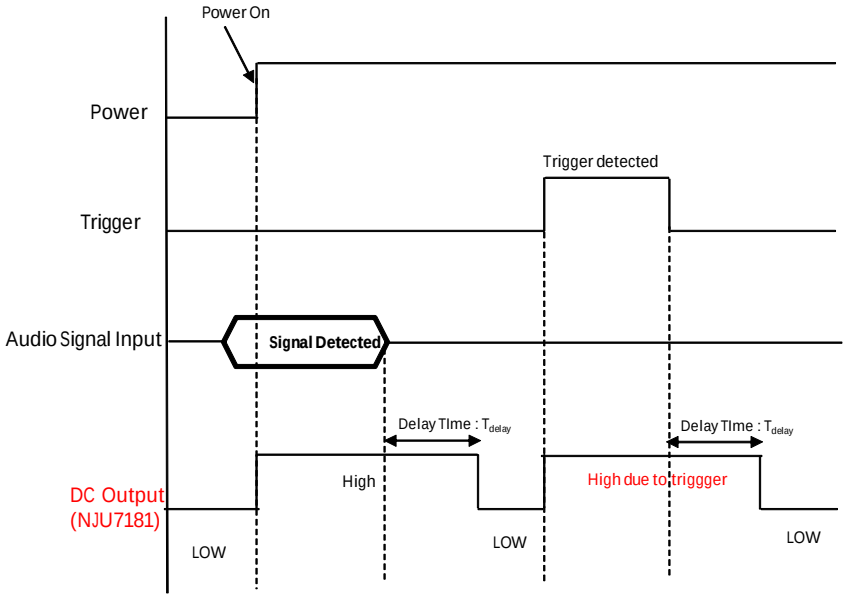
Scenario 2: Only Audio Signal detected
– Output will be or maintain high when **either an input signal or trigger signal is detected**. The delay circuit will only be activated **when both signals is not present**. NJU7181 will then hold the output level for a delay time which can be adjusted by the Capacitor value @ pin 5.

Audio signal present



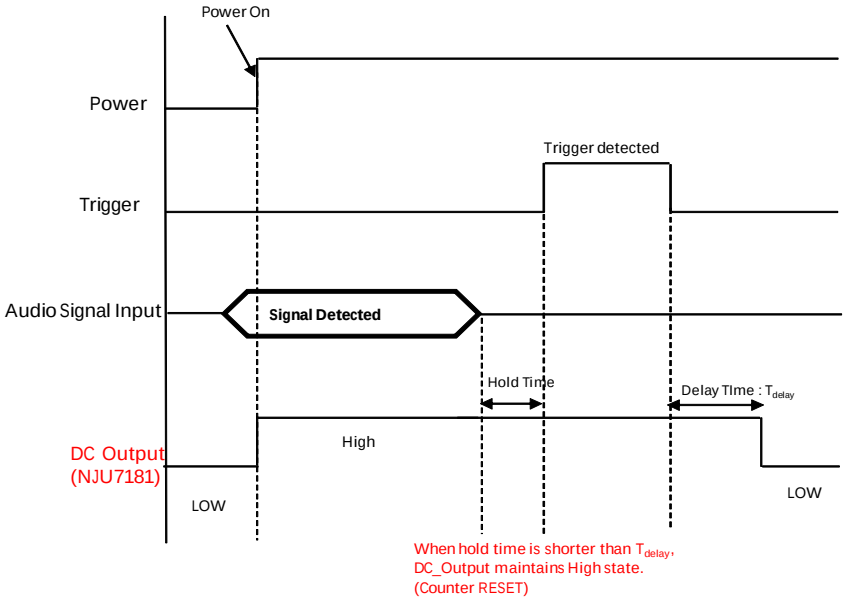
Scenario 3: Trigger Signal detected (Case 1)
– Output will be or maintain high when **either an input signal or trigger signal is detected**. The delay circuit will only be activated **when both signals is not present**. Output is set to Low state when a delay time passes. Output is set to High state when either an input signal or trigger signal is detected again.

Case 1: Trigger signal present (After output LOW)



Scenario 4: Trigger Signal detected (Case 2)
– Output will be or maintain high when **either an input signal or trigger signal is detected**. When hold time is shorter than a delay time, output maintains High state (Counter RESET). NJU7181 will then hold the output level for a delay time which can be adjusted by the Capacitor value @ pin 5.

Case 2: Trigger signal present (During output HIGH)



◆ **Input Sensitivity [Ta =25°C]**

The input sensitivity is defined as follows.

V_{INS}=20*log(R1/R2) – 21.5 [dBV] ----- (1)

Note) The input sensitivity recommends the setting of -60dBV (1mVrms) or more.
Note) The R2 value should be 100kΩ or more.

◆ **Frequency Response**

The input capacitor “Ci” forms HPF with “R1”. The cut-off frequency is defined as follows. Please decide C1 value in consideration of the frequency response necessary for the signal-detecting.

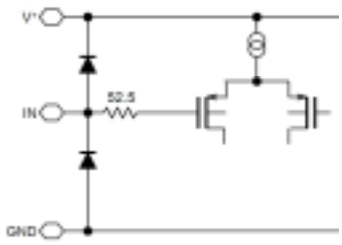
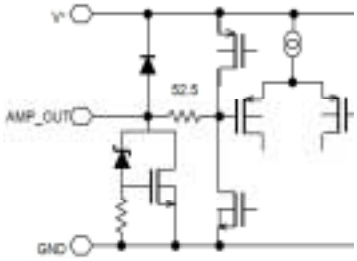
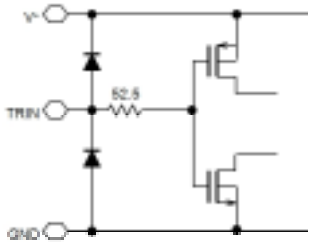
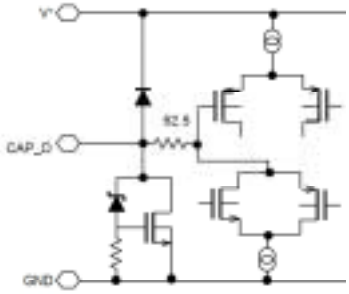
fc=1/(2π×Ci×R1) [Hz] ----- (2)

◆ **Delay time [With R_D = 220Kohm]**

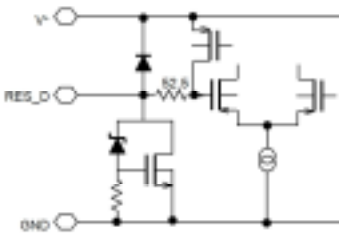
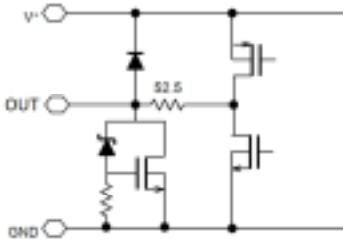
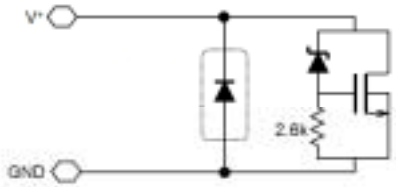
The Recovery time is defined as follows.

T_{delay}=1.5*10^8*C_R [sec] ----- (3)

■ **TERMINAL DESCRIPTION**

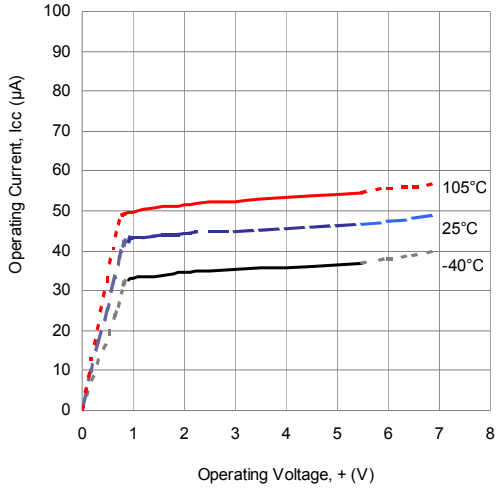
Terminal	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
1	IN	AC Input		0.3V
2	AMP_OUT	Amplifier Output		0.3V
3	TRIN	External Trigger Input		-
5	CAP_D	Delay Time Capacitor		0V

■ **TERMINAL DESCRIPTION**

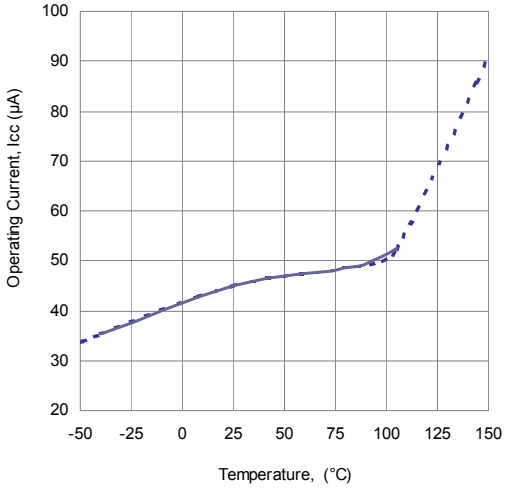
Terminal	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
6	RES_D	Delay Time Resistor		3uA x R_D
7	OUT	DC Output		0 or V^+
8	V^+	Supply Voltage		V^+

■ TYPICAL CHARACTERISTICS

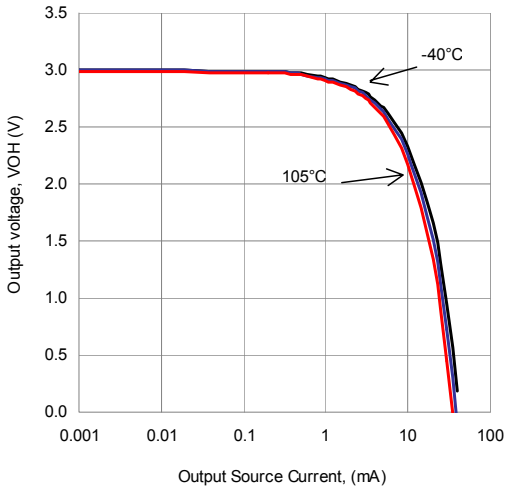
Operating Current Vs Operating Voltage
Cd = 10nF, Rd = 220kΩ, No Input



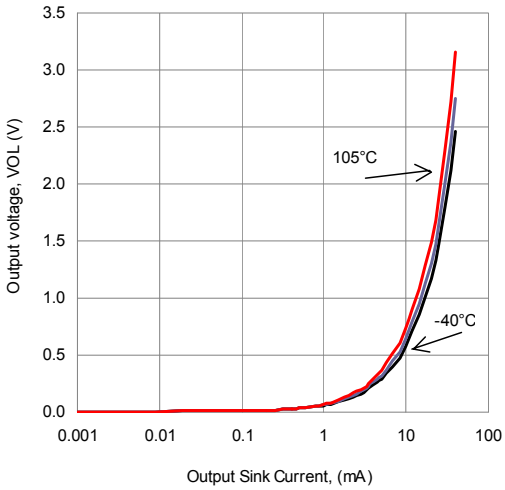
Operating current Vs Temperature
VDD = 3V, Cd = 10nF, Rd = 220kΩ, No Input



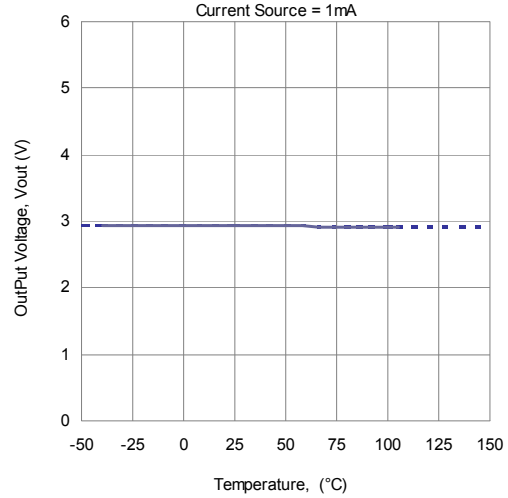
Output Voltage Vs Output Current Source
VDD = 3V, Ta = 25°C, Cd = 10nF, Rd = 220kΩ, Output = High



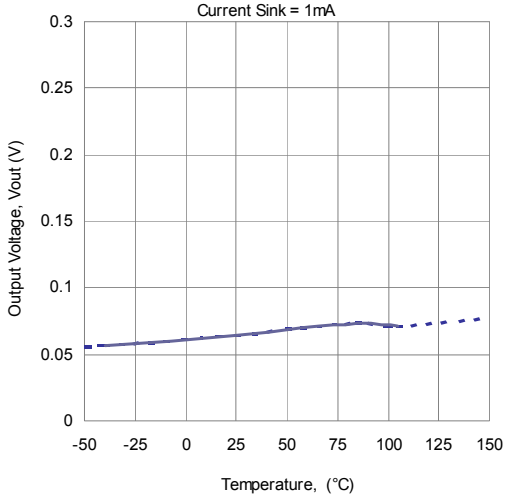
Output Voltage Vs Output Current Sink
VDD = 3V, Ta = 25°C, Cd = 10nF, Rd = 220kΩ, Output = High



Output Voltage Vs Temperature
VDD = 3V, Cd = 10nF, Rd = 220kΩ, Output = High,
Current Source = 1mA



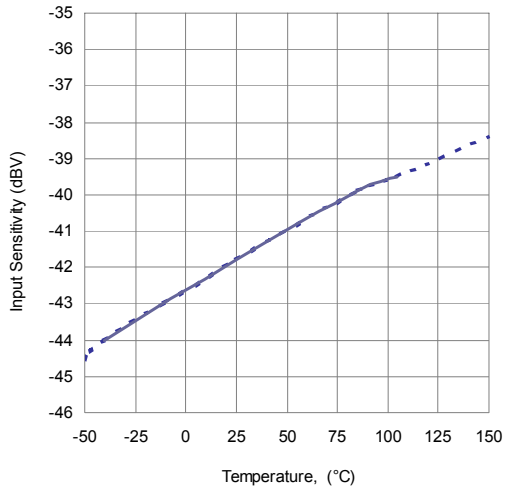
Output Voltage Vs Temperature
VDD = 3V, Cd = 10nF, Rd = 220kΩ, Output = High,
Current Sink = 1mA



■ TYPICAL CHARACTERISTICS

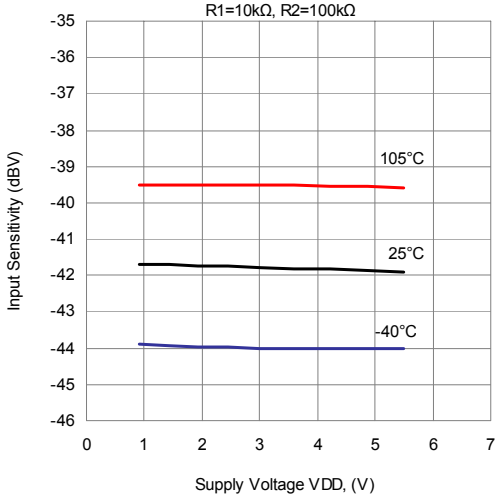
Input Sensitivity Vs Temperature

VDD = 3V, Cd = 10nF, Rd = 220kΩ, R1=10kΩ, R2=100kΩ



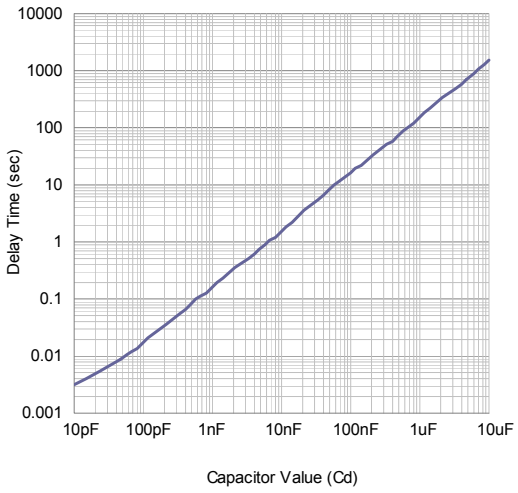
Input Sensitivity Vs Supply Voltage

VDD = 3V, Ta = 25°C, Cd = 10nF, Rd = 220kΩ, R1=10kΩ, R2=100kΩ



Delay Time Vs Capacitor

VDD = 3V, Ta = 25°C, Rd = 220kΩ, R1=10kΩ, R2=100kΩ



Gain vs Frequency

VDD = 3V, Ta = 25°C, Cd = 10nF, Rd = 220kΩ, Measure @ pin 2 (AMP_OUT)