

VOLTAGE DETECTOR with Delay Function

■ GENERAL DESCRIPTION

The NJU7708/09 is a low quiescent current voltage detector with delay function featuring high precision detection voltage.

The detection voltage is fixed internally with an accuracy of 1.0%.

NJU7708 is Nch. Open Drain and NJU7709 of output circuit form is a C-MOS output.

■ PACKAGE OUTLINE

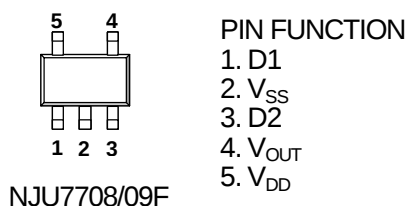


NJU7708/09F

■ FEATURES

- High Precision detection Voltage $\pm 1.0\%$
- Low Quiescent Current $1.3\mu\text{A}$
- Detection Voltage Range $1.5 \sim 6.0\text{V}$ (0.1V step)
- Adjustable Delay Time (D1/D2 2bit control) 0ms/50ms/100ms/200ms
- Output Circuit Form
NJU7708: Nch. Open Drain Type
NJU7709: C-MOS Output Type
- CMOS Technology
- Package Outline SOT-23-5 (MTP5)

■ PIN CONFIGURATION



■ DETECTION VOLTAGERANK LIST

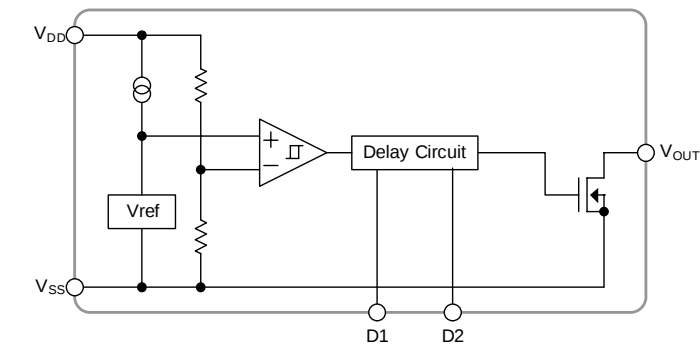
Device Name	V_{DET}
NJU7708/09F15	1.5V
NJU7708/09F27	2.7V
NJU7708/09F42	4.2V
NJU7708/09F06	6.0V

■ Logical Table of Delay Time

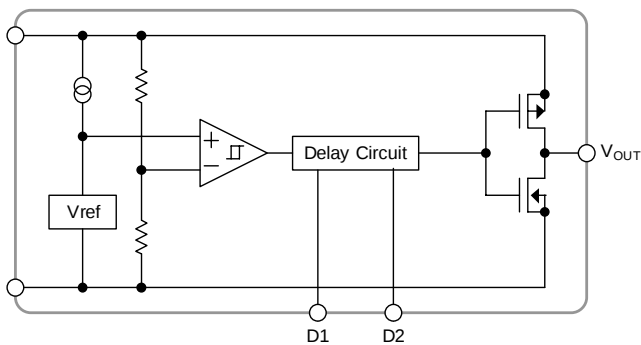
D1	D2	DELAY
H	H	0mS
H	L	50mS
L	H	100mS
L	L	200mS

■ EQUIVALENT CIRCUIT

NJU7708



NJU7709



■ NJU7708

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{DD}	+10	V
Output Voltage	V_{OUT}	$V_{SS}-0.3 \sim +10$	V
Output Current	I_{OUT}	50	mA
Power Dissipation	P_D	200	mW
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

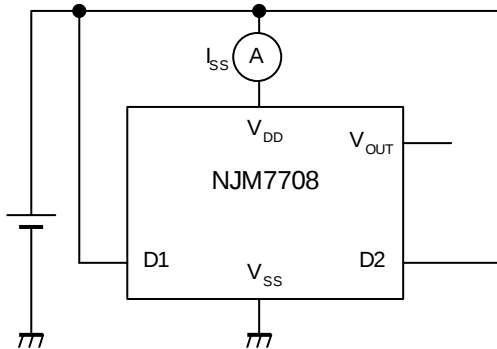
(Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Detection Voltage	V _{DET}			-1.0%	–	+1.0%	V
Hysterisis Voltage	V _{HYS}			70	90	130	V
Quiescent Current	I _{SS}	V _{DD} =V _{DET} +1V	V _{DET} =1.5V ~ 1.9V Version	–	1.0	1.7	μA
			V _{DET} =2.0V ~ 6.0V Version	–	1.3	2.2	μA
Output Current	I _{OUT}	Nch, V _{DS} =0.5V	V _{DD} =1.2V	0.75	2.0	–	mA
			V _{DD} =2.4V (≥2.7V Version)	4.5	7.0	–	mA
Output Leak Current	I _{LEAK}	V _{DD} =V _{OUT} =9V		–	–	0.1	μA
Detection Voltage Temperature Coefficient	ΔV _{DET} /ΔTa	Ta=0 ~ +85°C		–	±100	–	ppm/°C
Delay Time	td	V _{DD} =V _{DET} +1V,	D1=H, D2=H	25	100	300	μS
			D1=H, D2=L	42.5	50	57.5	mS
			D1=L, D2=H	85	100	115	mS
			D1=L, D2=L	170	200	230	mS
Delay Time control Voltage	V _{D1_H} / V _{D2_H}			1.5	–	V _{DD}	V
	V _{D1_L} / V _{D2_L}			0	–	0.3	V
Operating Voltage (*note 1)	V _{DD}	R _L =100kΩ		0.7	–	9	V

(*note 1): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

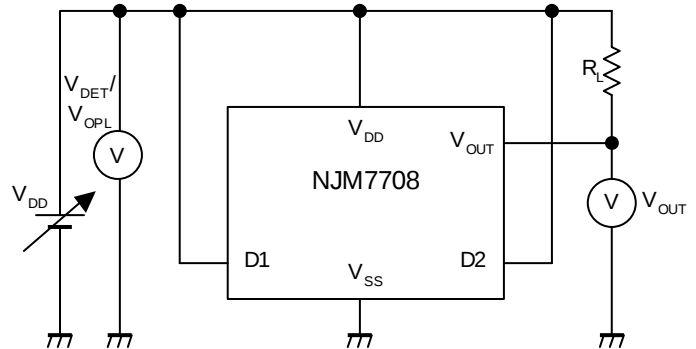
■ TEST CIRCUIT

● Quiescent Current TEST CIRCUIT

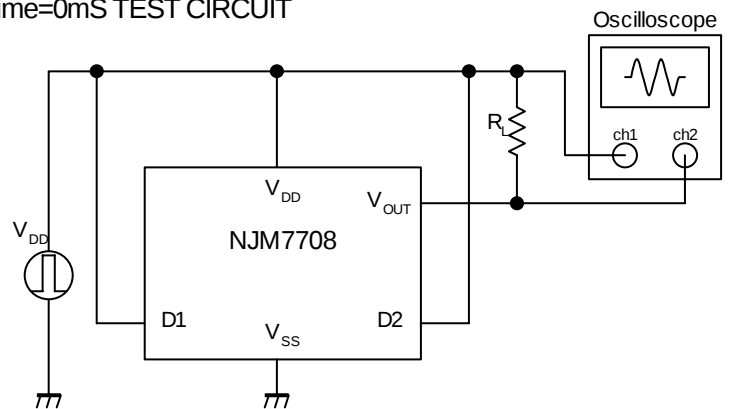
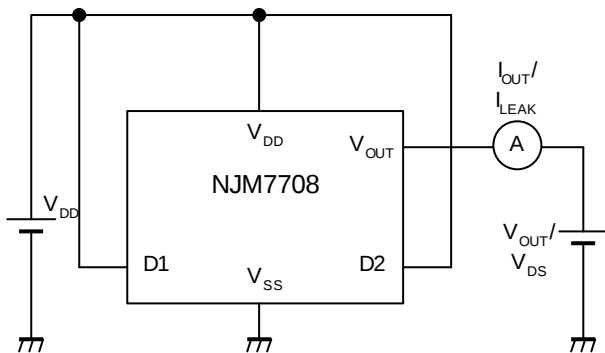


● Detection Voltage

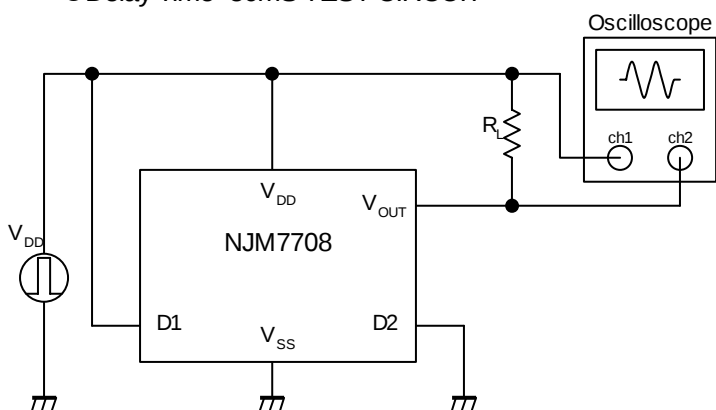
/Minimum Operating Voltage TEST CIRCUIT



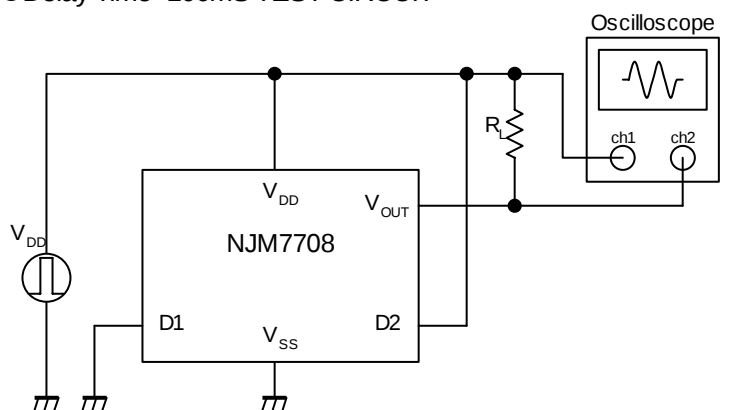
● Leak Current/Output Current TEST CIRCUIT ● Delay Time=0ms TEST CIRCUIT



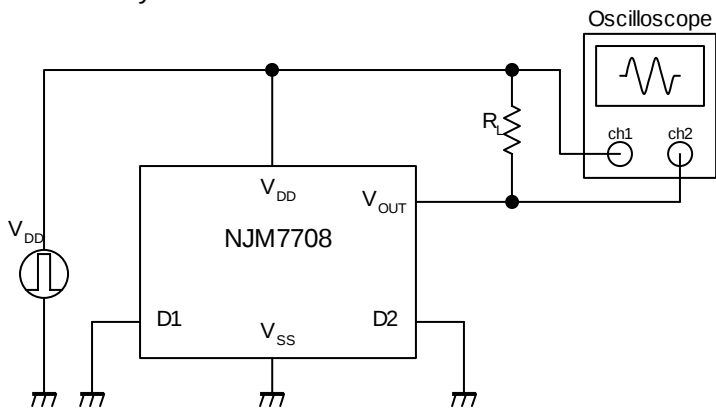
● Delay Time=50ms TEST CIRCUIT



● Delay Time=100ms TEST CIRCUIT

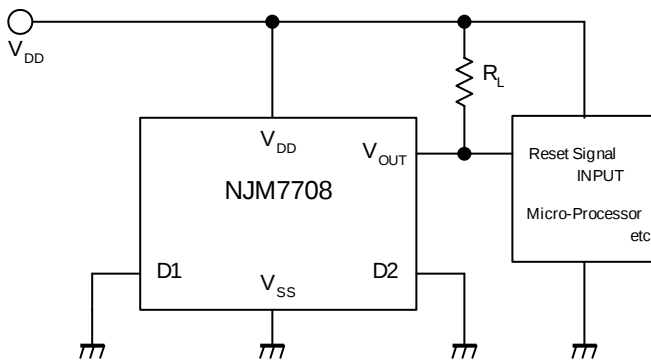


● Delay Time=200mS TEST CIRCUIT

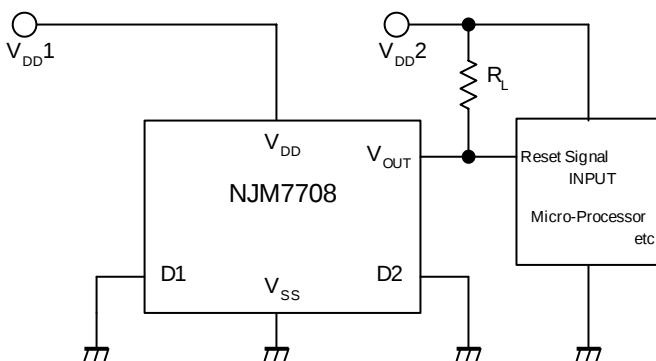


■ TYPICAL APPLICATION

① Power Supply Voltage Supervisory Circuit



② Power Supply Voltage Supervisory Circuit (Another Power Supply to Micro-Processor)



■ NJU7709

■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{DD}	+10	V
Output Voltage	V_{OUT}	$V_{SS}-0.3 \sim +10$	V
Output Current	I_{OUT}	50	mA
Power Dissipation	P_D	200	mW
Operating Temperature	Topr	-40 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

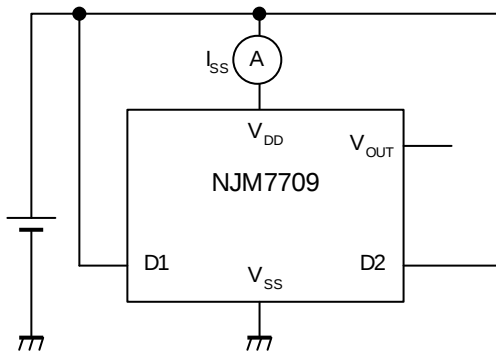
(Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
Detection Voltage	V _{DET}			-1.0%	—	+1.0%	V
Hysterisis Voltage	V _{HYS}			70	90	130	V
Quiescent Current	I _{SS}	V _{DD} =V _{DET} +1V	V _{DET} =1.5V ~ 1.9V Version	—	1.0	1.7	μA
			V _{DET} =2.0V ~ 6.0V Version	—	1.3	2.2	μA
Output Current	I _{OUT}	Nch, V _{DS} =0.5V	V _{DD} =1.2V	0.75	2.0	—	mA
			V _{DD} =2.4V(≥2.7V Version)	4.0	7.0	—	mA
		Pch, V _{DS} =0.5V	V _{DD} =4.8V(≤3.9V Version)	2.0	3.5	—	mA
			V _{DD} =6.0V(4.0V~5.6V Version)	2.5	4.0	—	mA
			V _{DD} =8.4V (≥5.7V Version)	3.0	5.0	—	mA
Detection Voltage Temperature Coefficient	ΔV _{DET} /ΔTa	Ta=0 ~ +85°C		—	±100	—	ppm/°C
Delay Time	td	V _{DD} =V _{DET} +1V,	D1=H, D2=H	25	100	300	μS
			D1=H, D2=L	42.5	50	57.5	mS
			D1=L, D2=H	85	100	115	mS
			D1=L, D2=L	170	200	230	mS
Delay Time control Voltage	V _{D1_H} / V _{D2_H}			1.5	—	V _{DD}	V
	V _{D1_L} / V _{D2_L}			0	—	0.3	V
Operating Voltage (*note 2)	V _{DD}	R _L =100kΩ		0.8	—	9	V

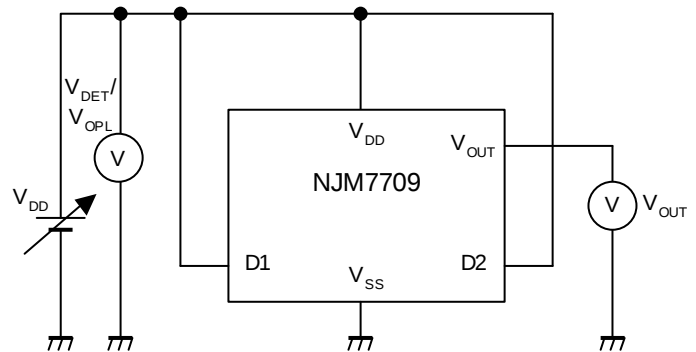
(*note 2): The minimum Operating Voltage(V_{OPL}) indicates the same value of the output voltage(V_{OUT}) on condition that V_{OUT} becomes 10% or less of the input voltage(V_{DD}).

■ TEST CIRCUIT

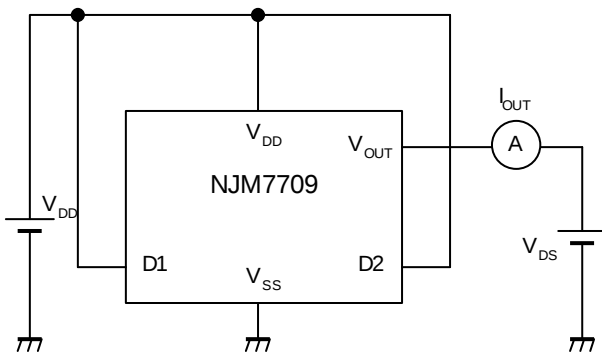
● Quiescent Current TEST CIRCUIT



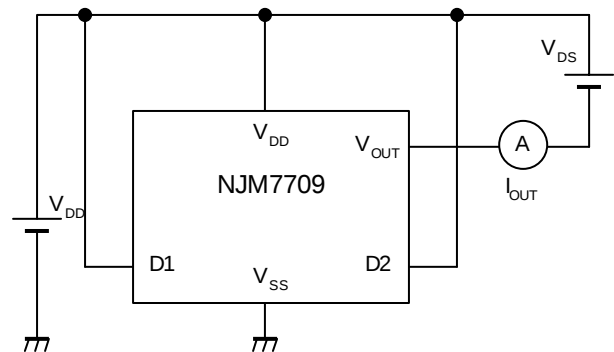
● Detection Voltage TEST CIRCUIT



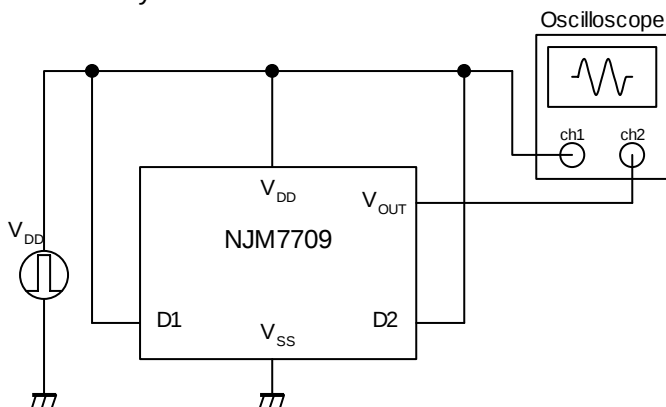
● Nch Output Current TEST CIRCUIT



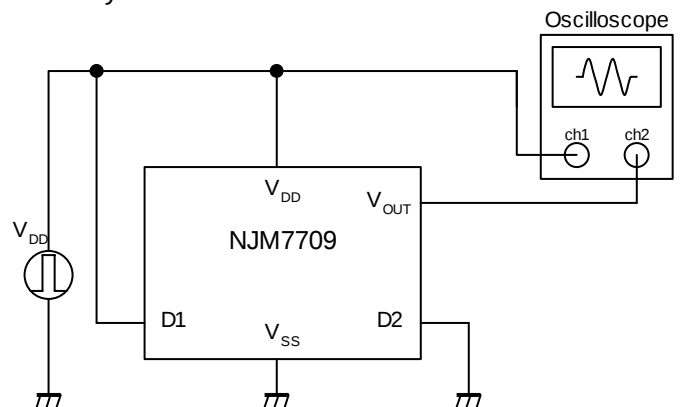
● Pch Output Current TEST CIRCUIT



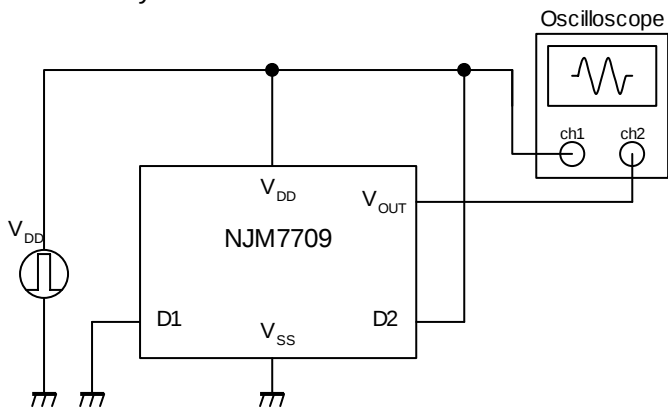
● Delay Time=0mS TEST CIRCUIT



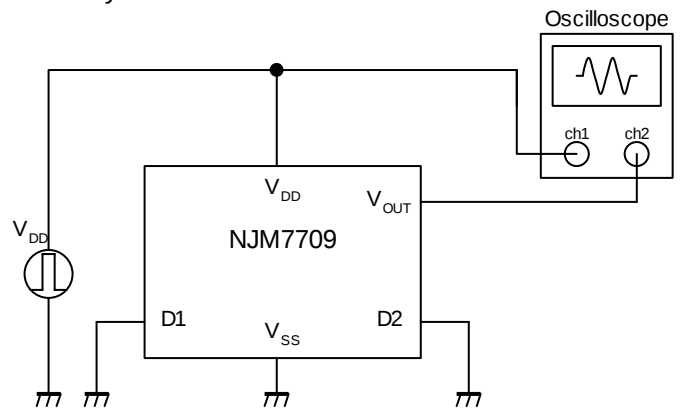
● Delay Time=50mS TEST CIRCUIT



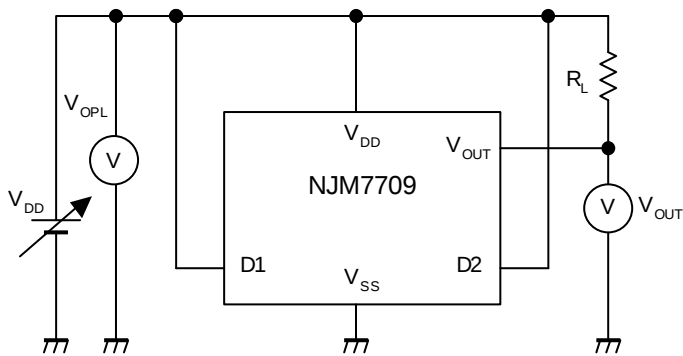
● Delay Time=100mS TEST CIRCUIT



● Delay Time=200mS TEST CIRCUIT

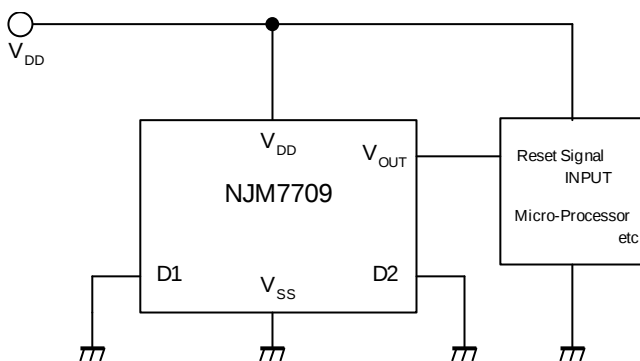


● Minimum Operating Voltage TEST CIRCUIT



■ TYPICAL APPLICATION

① Power Supply Voltage Supervisory Circuit



[CAUTION]

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