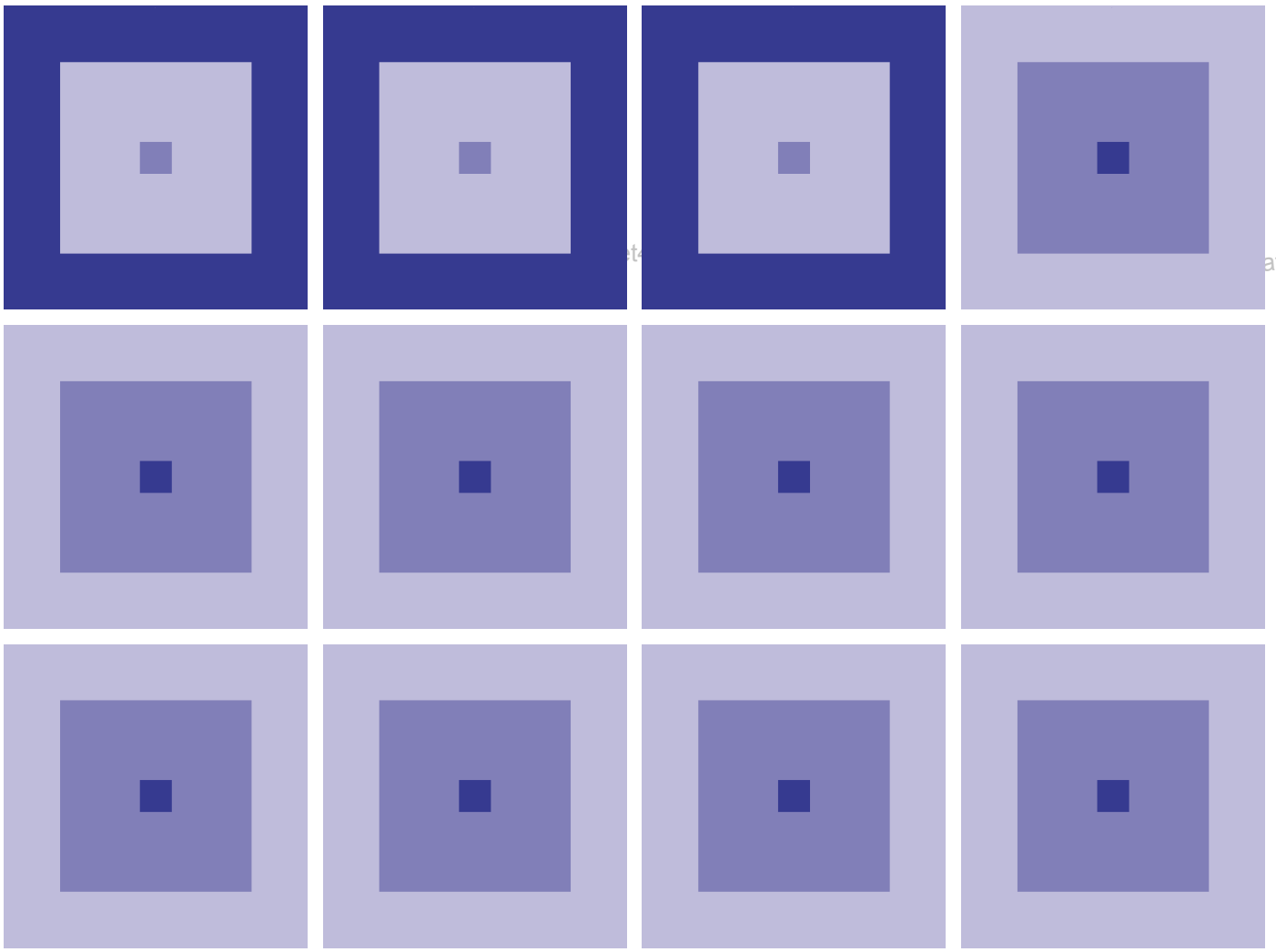
EPSON

Power Supply IC

S1F77201Y/S1F77211Y Series
Technical Manual



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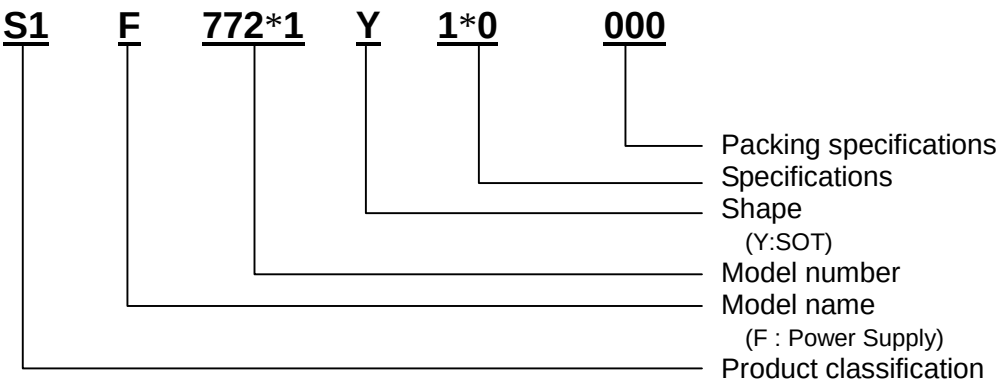
Configuration of product number

●DEVICES

S1 F 772*1 Y 1*0 000



CONTENTS

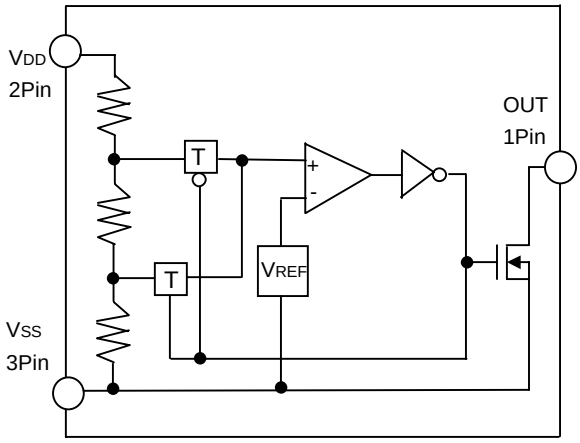
1. DESCRIPTION

The S1F772*1Y series is a nonadjustable voltage detector that was developed using the CMOS silicon-gate process.
It consists of four major components: reference voltage circuit with low current consumption, voltage comparator, hysteresis circuit, and output circuit.
This series, with the detecting voltage internally fixed, provides various standard products, which are classified into the following two types depending on the output mode of voltage detector output pins:
The S1F77201Y series is an N channel open drain output product; the S1F77211Y series is a CMOS output product.
The package is an SOT89-3pin plastic package.
This series also has functions that detects a battery life and monitors power voltage supplied to microcomputer and LSI systems.

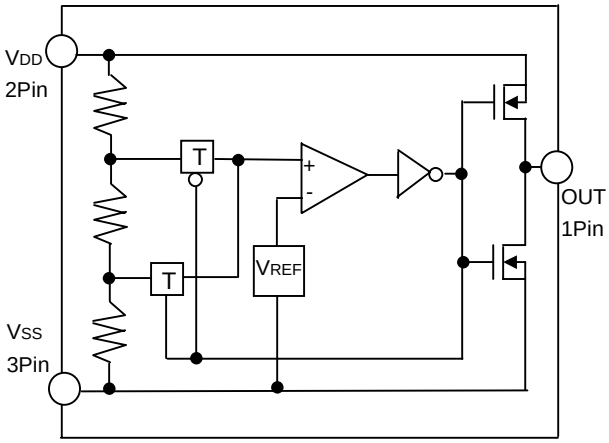
2. FEATURES

- Low current consumption: Typ. 4.0µA
- Allowable low voltage: Min. 1.5V
- Absolute maximum rated voltage: Max. 22V
- High-stable reference voltage supply built-in: Typ. 1.0V

3. BLOCK DIAGRAM



(S1F772**0**1Y**1*** type)



(S1F772**1**1Y**1*** type)

Note) The asterisk (*) indicates a code that varies depending on the detecting voltage value specifications.

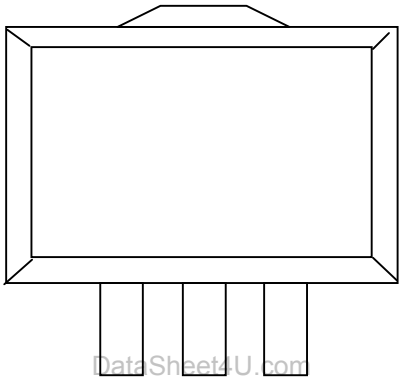
4. PIN DESCRIPTION

4.1 Pin Functions

Pin No.	Pin Name	Pin Function
1	OUT	Voltage detector output pin
2	V_{DD}	Input voltage pin (Positive side)
3	V_{SS}	Input voltage pin (Negative side)

4.2 Pin Assignment

SOT89-3pin

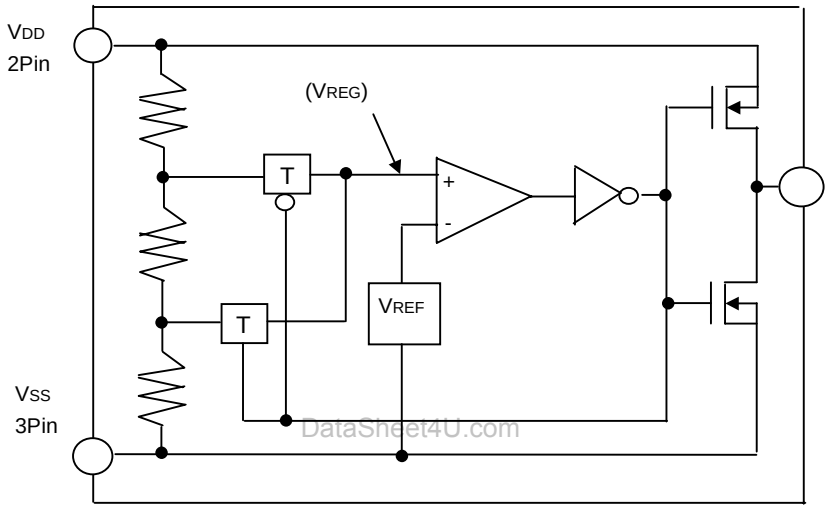


5. FUNCTIONAL DESCRIPTION

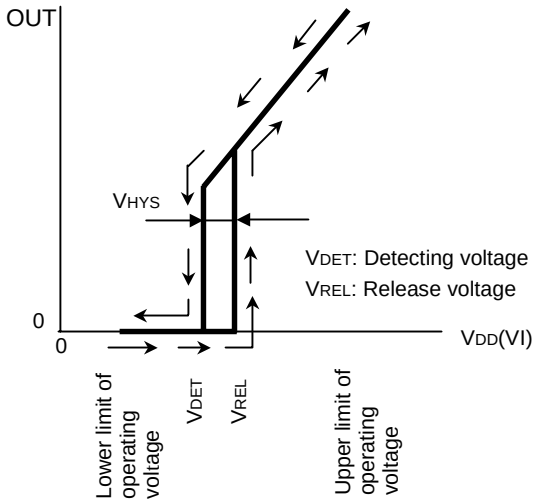
The S1F772*1Y series has the circuit configuration below. It inputs the dividing voltage (V_{REG}) of the resistor connected between power supplies and the reference voltage (V_{REF}) generated in the IC to the voltage comparator for voltage detection purposes. The voltage comparator detects a potential difference between V_{REG} and V_{REF} even if it is inappreciable; therefore, a hysteresis circuit is added to avoid an abnormality due to power noise and so on. In the example below, the detecting voltage (V_{DET}) with input voltage lowered and the release voltage (V_{REL}) with input voltage raised are set using the following formulas.

$$\text{Detecting voltage: } V_{DET} = \frac{R1+R2+R3}{R2+R3} \cdot V_{REF}$$

$$\text{Release voltage: } V_{REL} = \frac{R1+R2+R3}{R3} \cdot V_{REF}$$



The figure below shows the S1F772*1Y series input-output characteristics.



(S1F772*1Y**1*** type)

Note 1) The sample figures above show input-output characteristics when the pull-up resistor is connected to an output pin, and the pull-up resistor is connected between the OUT and V_{DD} pins.

Note 2) If the input voltage applied between the V_{DD} and V_{SS} pins is below the lower limit of IC operating voltage, the OUT pin is placed into an undefined output state. Be careful not to cause any abnormality during circuit operation.

6. SERIES PRODUCT NAME LIST

Product Name	Detecting Voltage			Output Mode	Output Phase	
	Min.	Typ.	Max.		V_{DET} or less	V_{DET} or more
S1F77201Y1C00	2.10	2.15	2.20	N channel open drain	Low level	Hi-Z
S1F77201Y1F00	2.60	2.65	2.70	N channel open drain	Low level	Hi-Z
S1F77201Y1T00	3.90	4.00	4.10	N channel open drain	Low level	Hi-Z
S1F77211Y1R00	2.73	2.80	2.87	CMOS	Low level	High level
S1F77211Y1G00	2.93	3.00	3.07	CMOS	Low level	High level
S1F77211Y1T00	3.90	4.00	4.10	CMOS	Low level	High level
S1F77211Y1J00	4.30	4.40	4.50	CMOS	Low level	High level

7. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rated Value	Unit
Power voltage range	V_{DD} - V_{SS}	22	V
Output voltage	V_O	22 and V_{DD} + 0.6 to V_{SS} - 0.6 (S1F77211)	
		22 to V_{SS} - 0.6 (S1F77201)	
Output current	I_O	50	mA
Allowable dissipation	Pd	200	mW
Operating temperature	Topr	-40 to +85	°C
Storage ambient temperature	Tstg	-65 to +150	
Soldering time Soldering temperature	Tsol	260°C 10sec. (Lead part)	

8. ELECTRICAL CHARACTERISTICS

(1) S1F77201Y1C00

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating voltage	V_{DD}	—	1.5	—	12.0	V
Detecting voltage	V_{DET}	T_a = 25°C	2.10	2.15	2.20	V
Hysteresis width	V_{HYS}	$V_{HYS} = V_{REL} - V_{DET}$	0.05	0.10	0.15	V
Current consumption	I_{DD}	V_{DD} = 3.0V	—	4.00	6.00	µA
Detecting voltage Temperature characteristics	$\Delta V_{DET}/V_{DET}$	—	-400	-150	+100	ppm/°C
Low level Output current	I_{OL}	V_{DD} = 2.0V OUT = 0.2V	0.15	0.75	—	mA
Detecting voltage Response time	T_{PHL}	V_{DD} = 3.0V → 2.0V T_a = 25°C	—	8	40	µs
		V_{DD} = 3.0V → 2.0V Ta = -30°C to +85°C	—	—	200	µs

(2) S1F77201Y1F00

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating voltage	V_{DD}	—	1.5	—	12.0	V
Detecting voltage	V_{DET}	T_a = 25°C	2.60	2.65	2.70	V
Hysteresis width	V_{HYS}	$V_{HYS} = V_{REL} - V_{DET}$	0.05	0.10	0.15	V
Current consumption	I_{DD}	V_{DD} = 3.0V	—	4.00	6.00	µA
Detecting voltage Temperature characteristics	$\Delta V_{DET}/V_{DET}$	—	-400	-150	+100	ppm/°C
Low level Output current	I_{OL}	V_{DD} = 2.0V OUT = 0.2V	0.20	1.00	—	mA
Detecting voltage Response time	T_{PHL}	V_{DD} = 3.0V → 2.0V T_a = 25°C	—	8	40	µs
		V_{DD} = 3.0V → 2.0V Ta = -30°C to +85°C	—	—	200	µs

(3) S1F77201Y1T00

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating voltage	V_{DD}	—	1.5	—	12.0	V
Detecting voltage	V_{DET}	T_a = 25°C	3.90	4.00	4.10	V
Hysteresis width	V_{HYS}	$V_{HYS} = V_{REL} - V_{DET}$	0.13	0.20	0.27	V
Current consumption	I_{DD}	V_{DD} = 5.0V	—	4.00	6.00	µA
Detecting voltage Temperature characteristics	$\Delta V_{DET}/V_{DET}$	—	-400	-150	+100	ppm/°C
Low level Output current	I_{OL}	V_{DD} = 2.0V OUT = 0.2V	0.20	1.00	—	mA
Detecting voltage Response time	T_{PHL}	V_{DD} = 5.0V → 4.0V T_a = 25°C	—	8	40	µs
		V_{DD} = 5.0V → 4.0V T_a = -30°C to +85°C	—	—	200	µs

(4) S1F77211Y1R00

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating voltage	V_{DD}	—	1.5	—	12.0	V
Detecting voltage	V_{DET}	T_a = 25°C	2.73	2.80	2.87	V
Hysteresis width	V_{HYS}	$V_{HYS} = V_{REL} - V_{DET}$	0.05	0.10	0.15	V
Current consumption	I_{DD}	V_{DD} = 3.0V	—	4.00	6.00	µA
Detecting voltage Temperature characteristics	$\Delta V_{DET}/V_{DET}$	—	-400	-150	+100	ppm/°C
High level Output current	I_{OH}	V_{DD} = 3.0V OUT = 2.7V	—	-1.00	-0.25	mA
Low level Output current	I_{OL}	V_{DD} = 2.0V OUT = 0.2V	0.20	1.00	—	mA
Detecting voltage Response time	T_{PHL}	V_{DD} = 3.0V → 2.0V T_a = 25°C	—	8	40	µs
		V_{DD} = 3.0V → 2.0V T_a = -30°C to +85°C	—	—	200	µs

8. ELECTRICAL CHARACTERISTICS

(5) S1F77211Y1G00

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating voltage	V_{DD}	—	1.5	—	12.0	V
Detecting voltage	V_{DET}	T_a = 25°C	2.93	3.00	3.07	V
Hysteresis width	V_{HYS}	$V_{HYS} = V_{REL} - V_{DET}$	0.09	0.15	0.21	V
Current consumption	I_{DD}	V_{DD} = 4.0V	-	4.00	6.00	µA
Detecting voltage Temperature characteristics	$\Delta V_{DET}/V_{DET}$	—	-400	-150	+100	ppm/°C
High level Output current	I_{OH}	V_{DD} = 4.0V OUT = 3.6V	—	-1.60	-0.40	mA
Low level Output current	I_{OL}	V_{DD} = 2.0V OUT = 0.2V	0.20	1.00	—	mA
Detecting voltage Response time	T_{PHL}	V_{DD} = 3.5V → 2.5V T_a = 25°C	—	8	40	µs
		V_{DD} = 3.5V → 2.5V T_a = -30°C to +85°C	—	—	200	µs

(6) S1F77211Y1T00

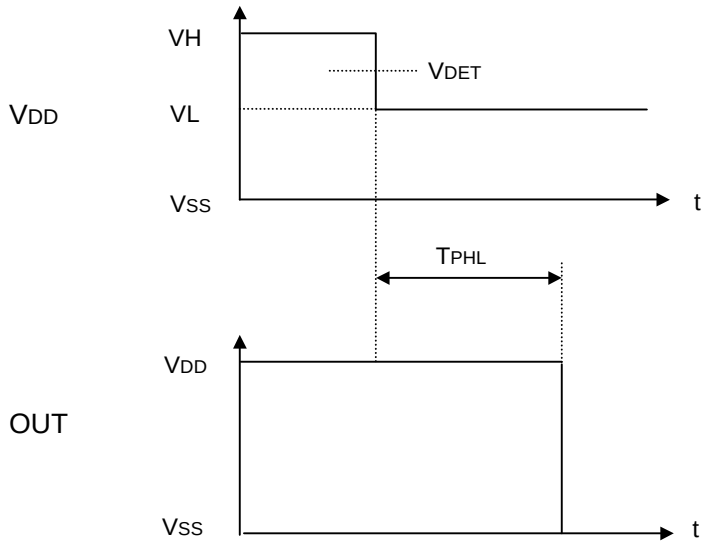
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating voltage	V_{DD}	—	1.5	—	12.0	V
Detecting voltage	V_{DET}	T_a = 25°C	3.90	4.00	4.10	V
Hysteresis width	V_{HYS}	$V_{HYS} = V_{REL} - V_{DET}$	0.13	0.20	0.27	V
Current consumption	I_{DD}	V_{DD} = 5.0V	—	4.00	6.00	µA
Detecting voltage Temperature characteristics	$\Delta V_{DET}/V_{DET}$	—	-400	-150	+100	ppm/°C
High level Output current	I_{OH}	V_{DD} = 5.0V OUT = 4.5V	—	-2.00	-0.50	mA
Low level Output current	I_{OL}	V_{DD} = 2.0V OUT = 0.2V	0.20	1.00	—	mA
Detecting voltage Response time	T_{PHL}	V_{DD} = 4.5V → 3.5V T_a = 25°C	—	8	40	µs
		V_{DD} = 4.5V → 3.5V T_a = -30°C to +85°C	—	—	200	µs

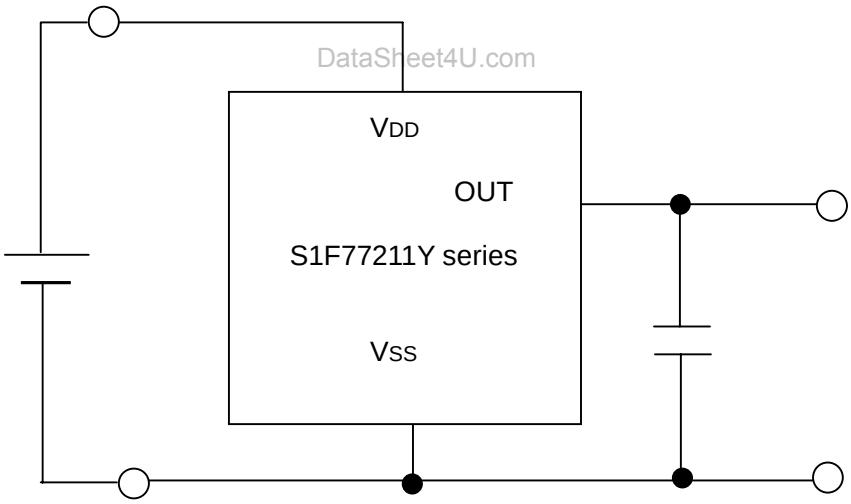
(7) S1F77211Y1J00

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating voltage	V_{DD}	—	1.5	—	12.0	V
Detecting voltage	V_{DET}	T_a = 25°C	4.30	4.40	4.50	V
Hysteresis width	V_{HYS}	$V_{HYS} = V_{REL} - V_{DET}$	0.13	0.20	0.27	V
Current consumption	I_{DD}	V_{DD} = 5.0V	—	4.00	6.00	µA
Detecting voltage Temperature characteristics	$\Delta V_{DET}/V_{DET}$	—	-400	-150	+100	ppm/°C
High level Output current	I_{OH}	V_{DD} = 5.0V OUT = 4.5V	—	-2.00	-0.50	mA
Low level Output current	I_{OL}	V_{DD} = 2.0V OUT = 0.2V	0.20	1.00	—	mA
Detecting voltage Response time	T_{PHL}	V_{DD} = 5.0V → 4.0V T_a = 25°C	—	8	40	µs
		V_{DD} = 5.0V → 4.0V T_a = -30°C to +85°C	—	—	200	µs

8. ELECTRICAL CHARACTERISTICS

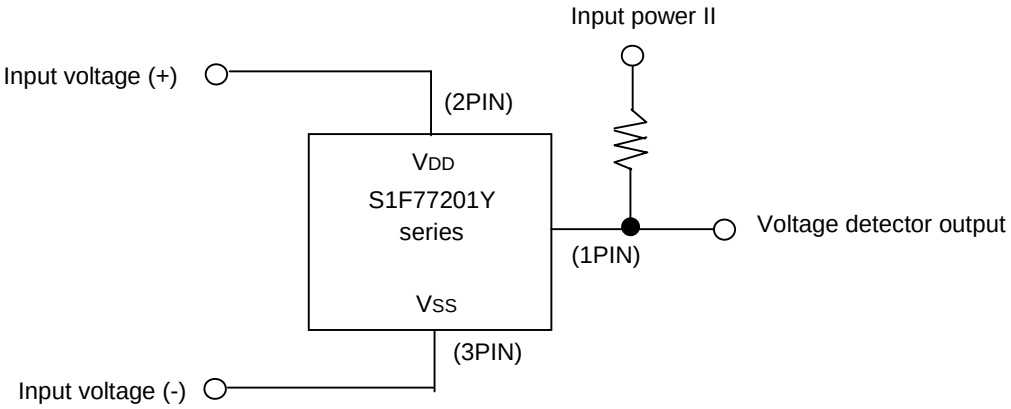
Note) Detecting voltage response time measurement diagram

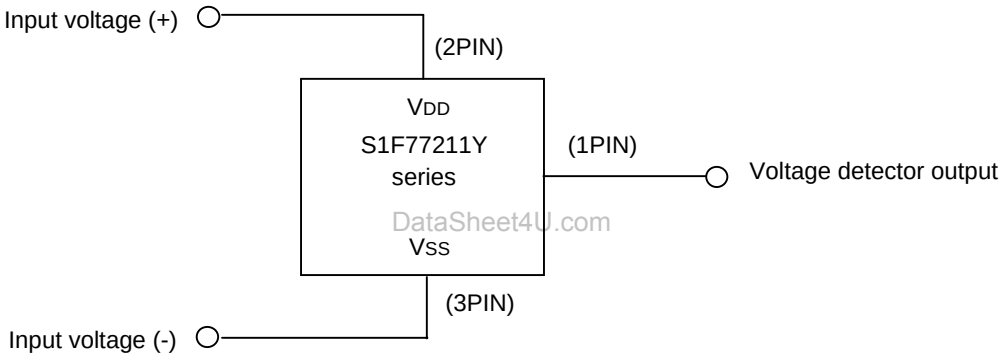




This diagram is based on the CMOS output product (V_{DET} or more: high level, V_{DET} or less: low level).

9. EXTERNAL CONNECTION SAMPLES

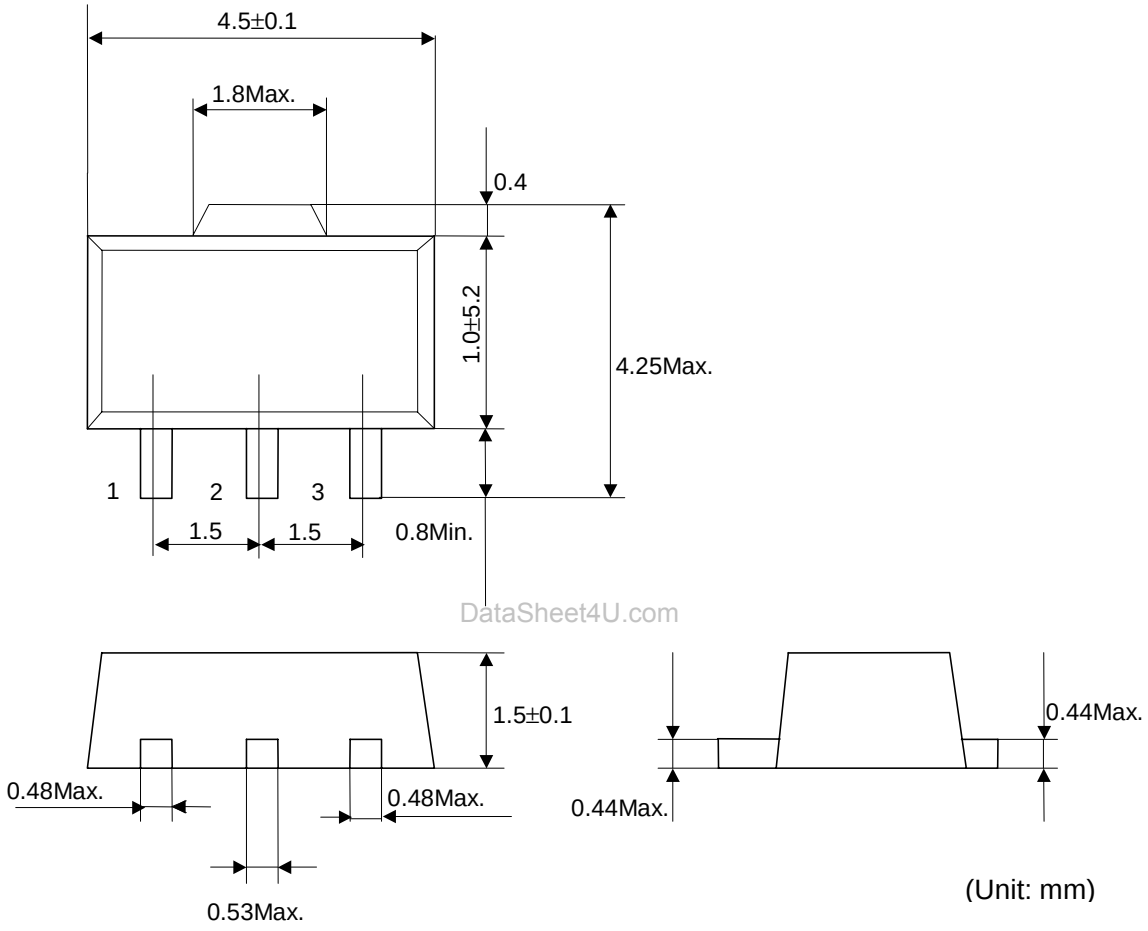




10. DIMENSIONAL OUTLINE DRAWING

Reference

SOT89-3pin



(Unit: mm)

Note) The contents may be altered without prior notice according to the continual improvement.

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Technical Manual

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