EPSON
EXCEED YOUR VISION

S1F78101Y Series
Technical Manual

SEIKO EPSON CORPORATION

Rev.1.4

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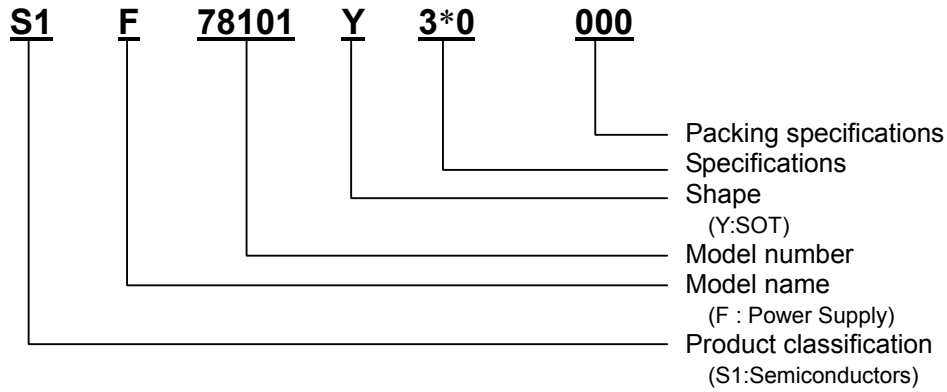
Configuration of product number

●DEVICES



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1. DESCRIPTION

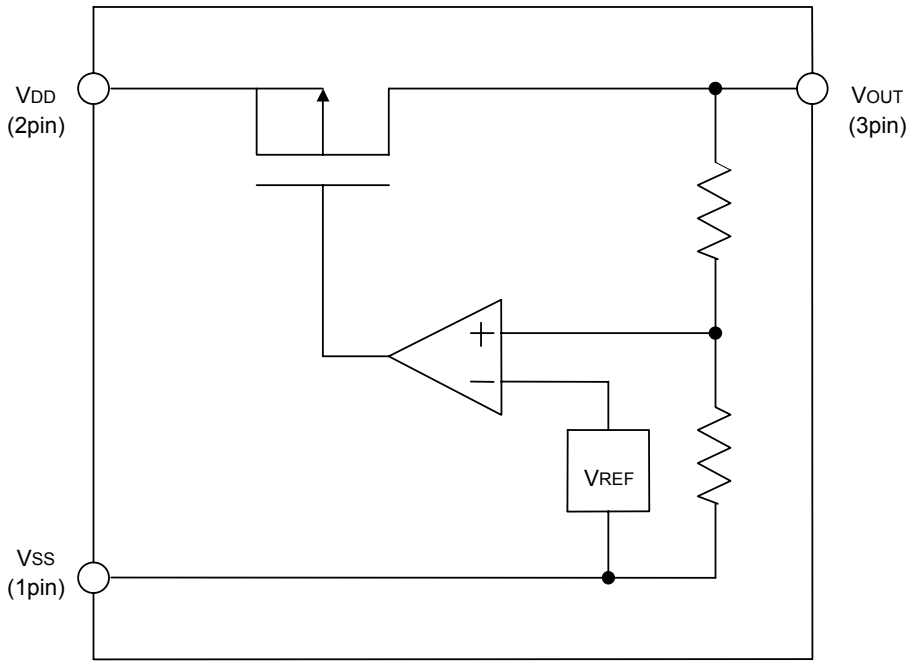
The S1F78101Y3 series is a fixed-level, positive voltage regulator developed using a CMOS silicon gate process and mainly consists of reference voltage circuit with low current consumption, differential amplifier, output control transistor, and voltage setting resistances. The output voltage is fixed inside the IC.

The package is an SOT89-3pin plastic package.

2. FEATURES

- Low current consumption : Typ. 3.0μA
- Small input-output voltage difference : Typ. 0.11V (IO = 10mA, V_{OUT} = 5.0V)
- Highly stable, internal reference voltage source : Typ. 1.0V
- Absolute maximum rated voltage : Max. 22V
- Wide operating voltage range : Max. 15V

3. BLOCK DIAGRAM



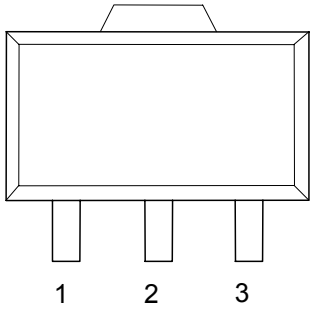
4. PIN DESCRIPTION

4.1 Pin Functions

Pin No.	Pin name	Pin function
1	VSS	Input voltage pin (negative side)
2	VDD	Input voltage pin (positive side)
3	VOUT	Output voltage pin

4.2 Pin Assignment

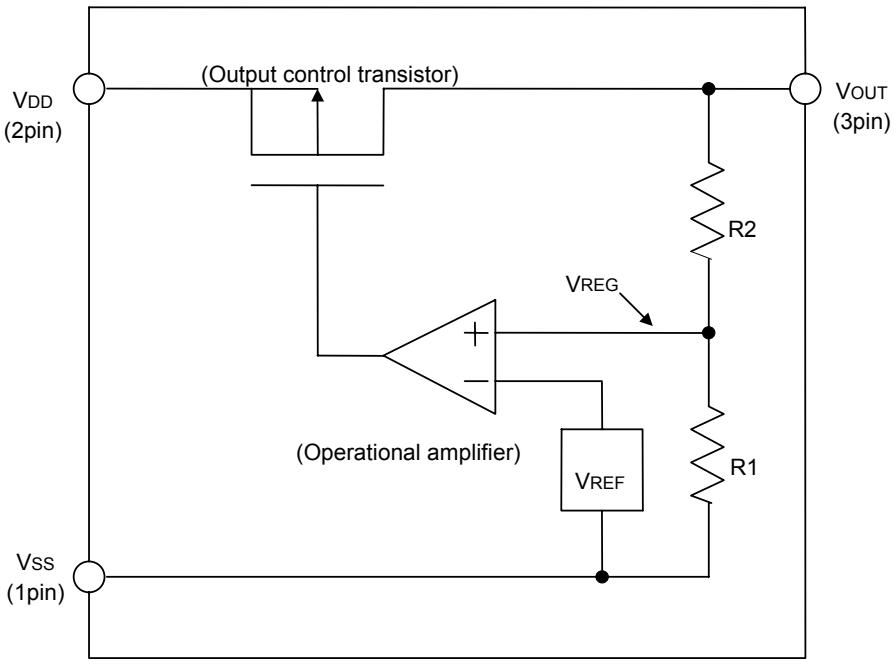
SOT89-3pin



5. FUNCTIONAL DESCRIPTION

The S1F78101Y3 series is a fixed-level, positive output voltage series regulator using an output control MOS transistor between input and output pins, as shown below. It is designed to output stable voltage (V_O) independent of input voltage by feeding the voltage (V_{REG}) divided by internal resistances (R1 and R2) connected between the output (V_{OUT}) and V_{SS} pins back to the operational amplifier and comparing it with the reference voltage (V_{REF}) to control the gate voltage of the output control transistor. The output voltage is internally fixed, which is obtained from the formula below.

$$V_{OUT} = \frac{R1 + R2}{R1} \cdot V_{REF}$$



This product has an internal inrush current limiter as a protective function.

The inrush current limiter function is designed to control power current to prevent excessive power current from flowing due to causes such as the load capacity connected to the output pin at power-on.

6. SERIES PRODUCT NAME LIST

Product name	Output voltage		
	Min.	Typ.	Max.
S1F78101Y3B00	4.90	5.00	5.10
S1F78101Y3K00	3.80	3.90	4.00
S1F78101Y3T00	3.23	3.30	3.37
S1F78101Y3C00	3.13	3.20	3.27

Note: Output voltages not described above are also available.

7. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Rated value	Unit
Input voltage	V_{DD} - V_{SS}	22	V
Output voltage	V_{OUT}	V_{DD}+0.3 to V_{SS}-0.3	
Output current	I_{OUT}	100	mA
Allowable dissipation	Pd	200	mW
Operating temperature	T_{opr}	-40 to +85	°C
Storage ambient temperature	T_{stg}	-65 to +150	
Soldering time Soldering temperature	T_{sol}	260°C 10 sec. (lead part)	—

8. RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Min.	Typ.	Max.	Unit
Input voltage	V_{DD} - V_{SS}	—	—	15	V
Output current	I_{OUT}	0.01	—	—	mA

9. ELECTRICAL CHARACTERISTICS

●S1F78101Y3B00

(If not specified, Ta = -40 to +85°C)

Item	Symbol	Condition (Vss = 0.0V)	Min.	Typ.	Max.	Unit
Input voltage	V_I		—	—	15	V
Output voltage	V_O	V_{DD} = 7.0V, I_O = -10mA T_a = 25°C	4.90	5.00	5.10	V
Current consumption	I_{OP}	V_{DD} = 5.0V to 15.0V Unloaded	—	3.0	6.2	μA
Input-output voltage difference	V_I - V_O	V_{OUT} = 5.0V, I_O = -10mA	—	0.11	0.22	V
Output voltage temperature characteristics	$\frac{\Delta V_{OUT}}{V_{OUT}}$		-320	-100	+40	ppm/°C
Input stability	$\frac{dV_O}{dV_I \cdot V_O}$	T_a = -30°C to +85°C (same temperature condition) V_{DD} = 6.0V to 15.0V I_O = -10mA	—	0.1	—	%/V
Load stability	ΔV_O	T_a = -30°C to +85°C (same temperature condition) V_{DD} =7.0V I_O = -1mA to -50mA	—	22	—	mV
Power supply rejection ratio	PSRR	V_{DD} = 7.0V, fin = 40kHz CL=10μF, I_{OUT} = -5mA	—	-40	—	dB

●S1F78101Y3K00

(If not specified, Ta = -40 to +85°C)

Item	Symbol	Condition (Vss = 0.0V)	Min.	Typ.	Max.	Unit
Input voltage	V_I		—	—	15	V
Output voltage	V_O	V_{DD} = 6.0V, I_O = -10mA T_a = 25℃	3.80	3.90	4.00	V
Current consumption	I_{OP}	V_{DD} = 3.9V to 15.0V Unloaded	—	3.0	6.2	μA
Input-output voltage difference	V_I - V_O	V_{OUT} = 3.9V, I_O = -10mA	—	0.14	0.28	V
Output voltage temperature characteristics	$\frac{\Delta V_{OUT}}{V_{OUT}}$		-320	-100	+40	ppm/°C
Input stability	$\frac{dV_O}{dV_I \cdot V_O}$	T_a = -30°C to +85°C (same temperature condition) V_{DD} = 5.0V to 15.0V I_O = -10mA	—	0.1	—	%/V
Load stability	ΔV_O	T_a = -30°C to +85°C (same temperature condition) V_{DD} = 6.0V I_O = -1mA to -40mA	—	19	—	mV
Power supply rejection ratio	PSRR	V_{DD} = 6.0V, fin = 40kHz CL = 10μF, I_{OUT} = -5mA	—	-40	—	dB

9. ELECTRICAL CHARACTERISTICS

●S1F78101Y3T00

(If not specified, Ta = -40 to 85°C)

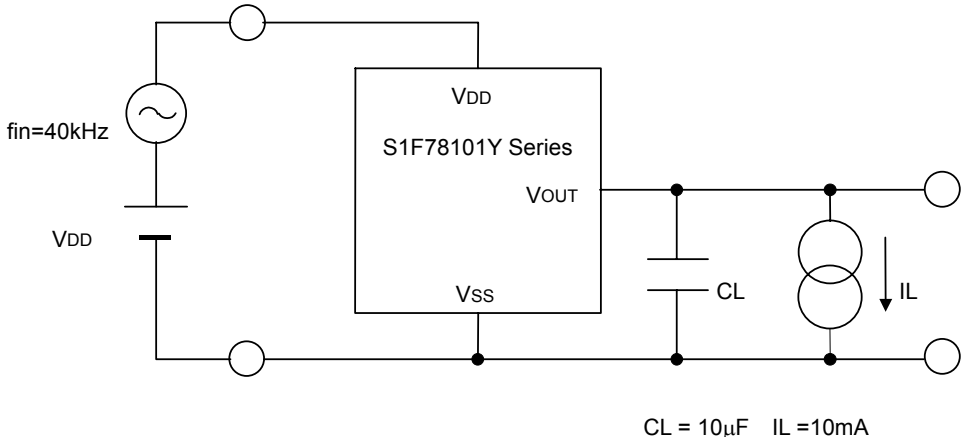
Item	Symbol	Condition (Vss = 0.0V)	Min.	Typ.	Max.	Unit
Input voltage	V_I		—	—	15	V
Output voltage	V_O	V_{DD} = 5.0V, I_O = -10mA T_a = 25°C	3.23	3.30	3.37	V
Current consumption	I_{OP}	V_{DD} = 3.3V to 15.0V Unloaded	—	3.0	6.2	μA
Input-output voltage difference	V_I - V_O	V_{OUT} = 3.3V, I_O = -10mA	—	0.16	0.32	V
Output voltage temperature characteristics	$\frac{\Delta V_{OUT}}{V_{OUT}}$		-320	-100	+40	ppm/°C
Input stability	$\frac{dV_O}{dV_I \cdot V_O}$	T_a = -30°C to +85°C (same temperature condition) V_{DD} = 4.0V to 15.0V I_O = -10mA	—	0.1	—	%/V
Load stability	ΔV_O	T_a = -30°C to +85°C (same temperature condition) V_{DD} = 5.0V I_O = -1mA to -30mA	—	17	—	mV
Power supply rejection ratio	PSRR	V_{DD} = 5.0V, fin = 40kHz CL = 10μF, I_{OUT} = -5mA	—	-40	—	dB

●S1F78101Y3C00

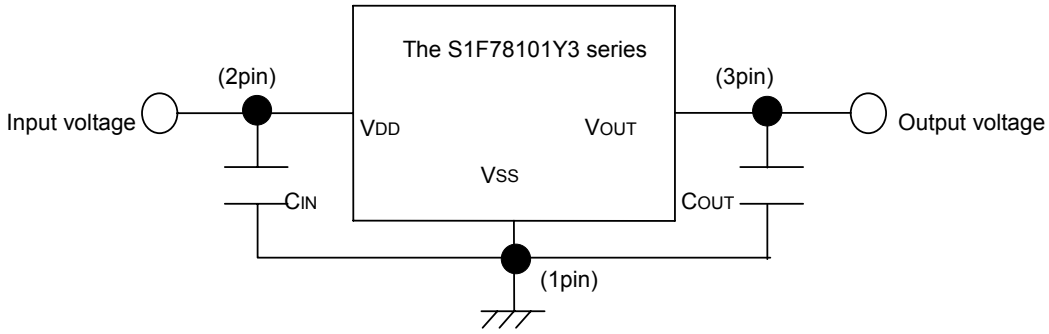
(If not specified, Ta = -40 to 85°C)

Item	Symbol	Condition (Vss = 0.0V)	Min.	Typ.	Max.	単位
Input voltage	V_I		—	—	15	V
Output voltage	V_O	V_{DD} = 5.0V, I_O = -10mA T_a = 25°C	3.13	3.20	3.27	V
Current consumption	I_{OP}	V_{DD} = 3.2V to 15.0V Unloaded	—	3.0	6.2	μA
Input-output voltage difference	V_I - V_O	V_{OUT} = 3.2V, I_O = -10mA	—	0.16	0.32	V
Output voltage temperature characteristics	$\frac{\Delta V_{OUT}}{V_{OUT}}$		-320	-100	+40	ppm/°C
Input stability	$\frac{dV_O}{dV_I \cdot V_O}$	T_a = -30°C to +85°C (same temperature condition) V_{DD} = 4.0V to 15.0V I_O = -10mA	—	0.1	—	%/V
Load stability	ΔV_O	T_a = -30°C to +85°C (same temperature condition) V_{DD} = 5.0V I_O = -1mA to -30mA	—	16	—	mV
Power supply rejection ratio	PSRR	V_{DD} = 5.0V, fin = 40kHz CL = 10μF, I_{OUT} = -5mA	—	-40	—	dB

Note: Schematic diagram for measuring power supply rejection ratio characteristics



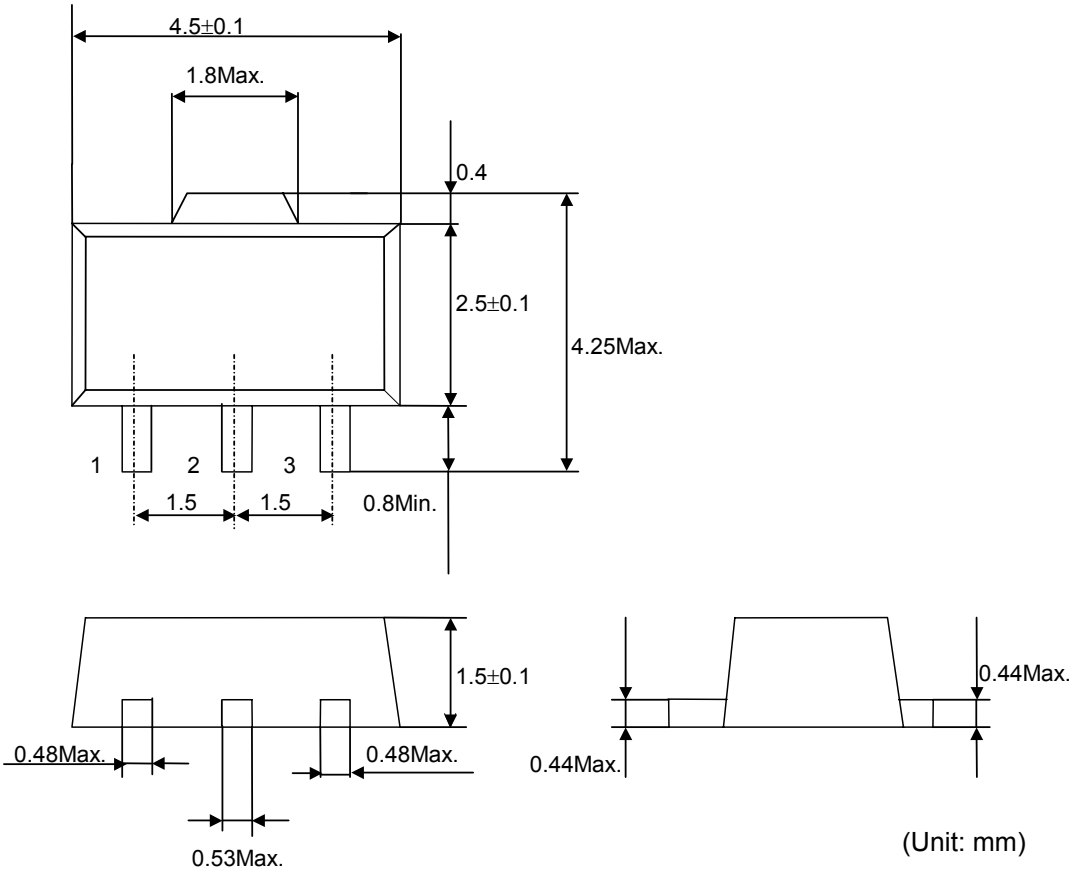
10. EXTERNAL CONNECTION SAMPLES



11. EXTERNAL DIMENSIONS DRAWINGS

Reference

SOT89-3pin



(Unit: mm)

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

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