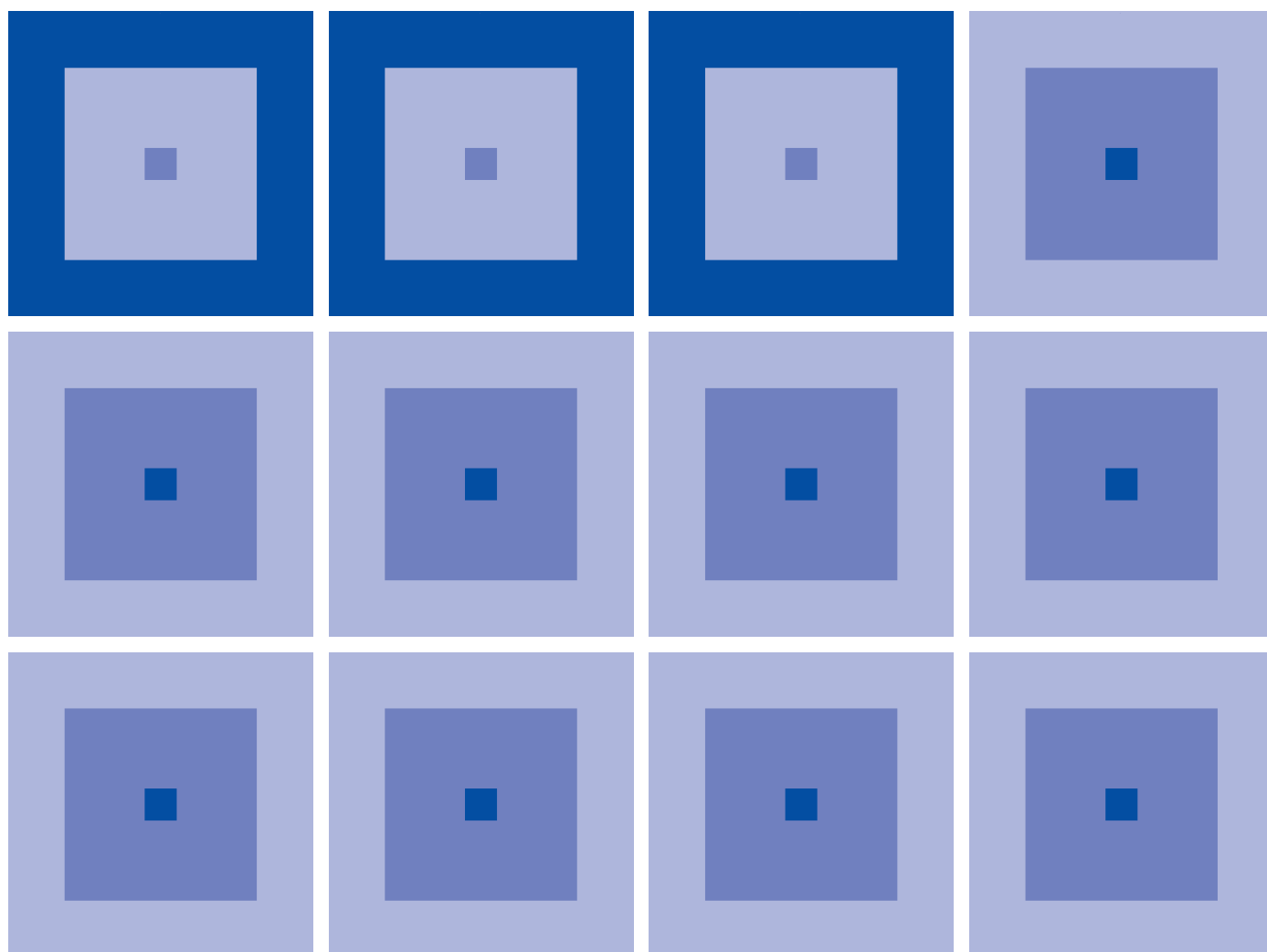


Power Supply IC
S1F78101Y
Technical Manual

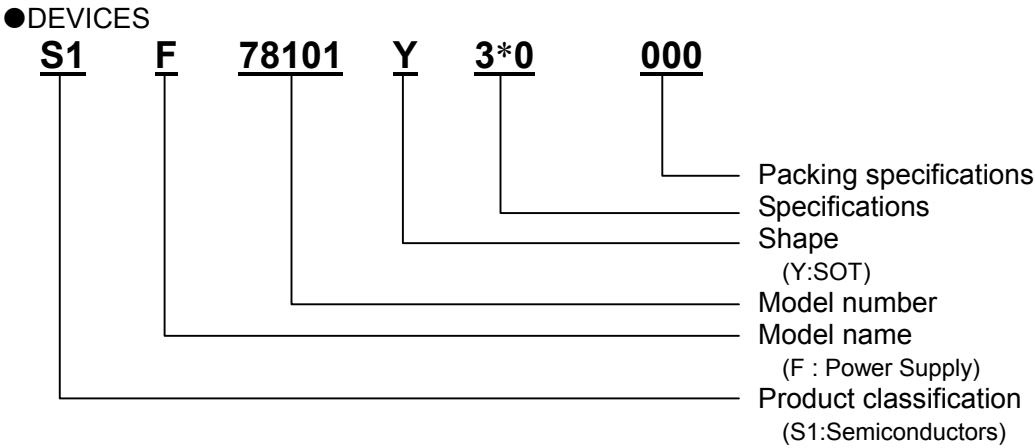


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Configuration of product number



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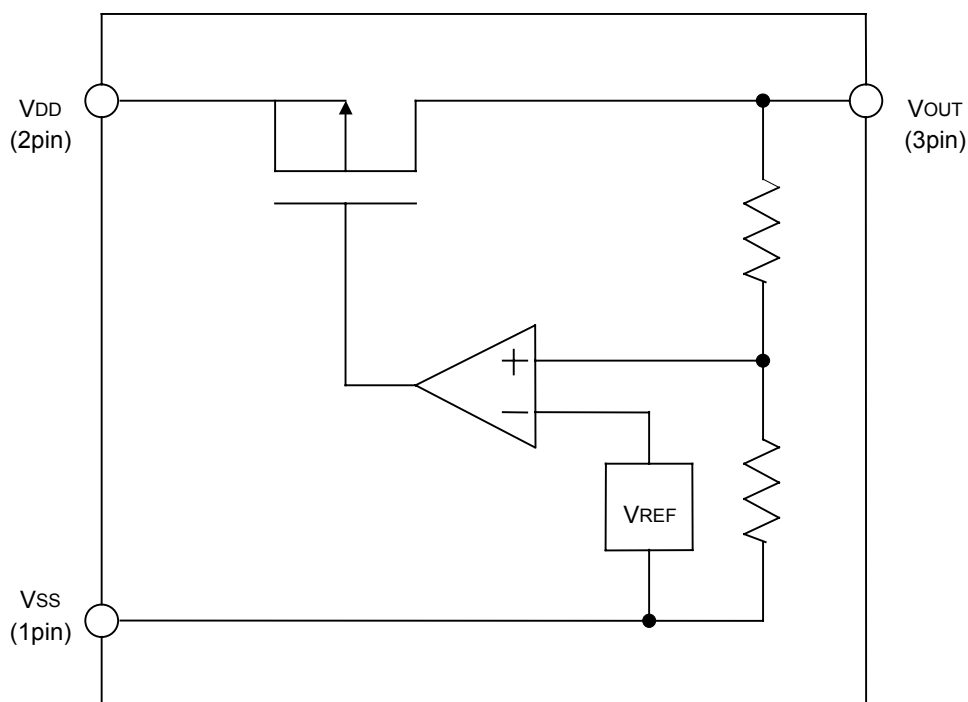
1. DESCRIPTION

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. 3.0 μ A
- Small input-output voltage difference : Typ. 0.11V ($I_O = 10\text{mA}$, $V_{OUT} = 5.0\text{V}$)
- Highly stable, internal reference voltage source : Typ. 1.0V
- Absolute maximum rated voltage : Max. 22V
- Wide operating voltage range : Max. 15V

3. BLOCK DIAGRAM



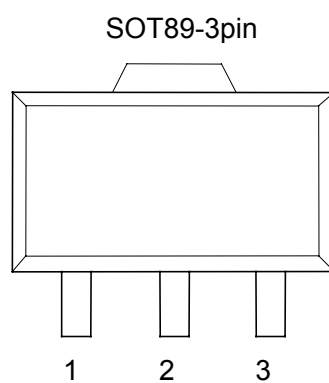
4. PIN DESCRIPTION

4. 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

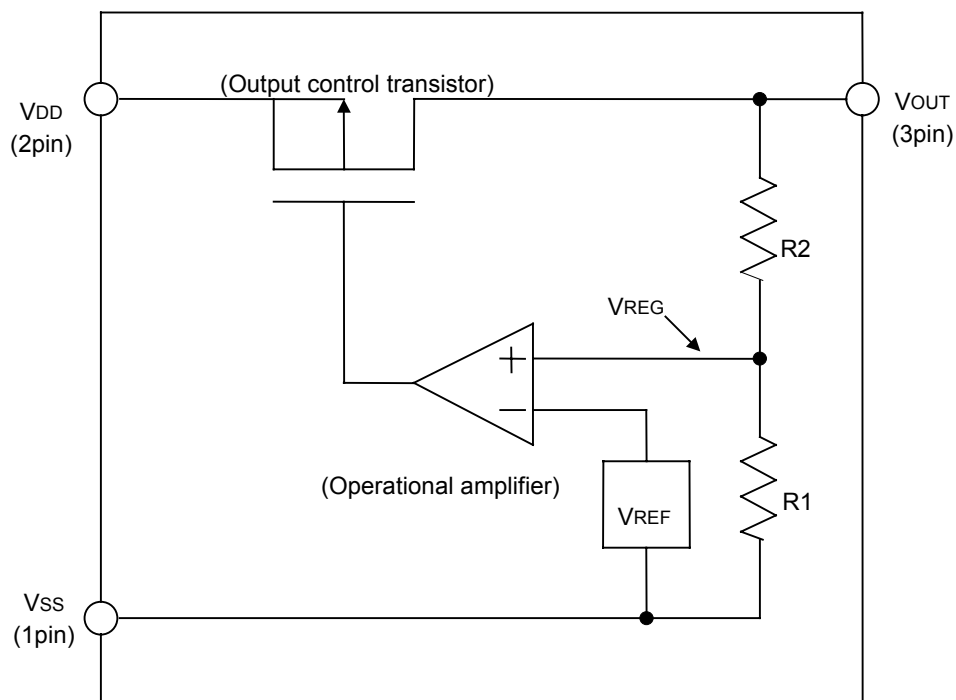
4.2 Pin Assignment



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

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	VDD - VSS	22	V
Output voltage	VOUT	VDD+0.3 to VSS-0.3	
Output current	IOUT	100	mA
Allowable dissipation	Pd	200	mW
Operating temperature	Topr	-40 to +85	°C
Storage ambient temperature	Tstg	-65 to +150	
Soldering time	Tsol	260°C	—
Soldering temperature		10 sec. (lead part)	

8. RECOMMENDED OPERATING CONDITIONS

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

●S1F78101Y3K00

(If not specified, Ta = -40 to +85°C)

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

9. ELECTRICAL CHARACTERISTICS

●S1F78101Y3T00

(If not specified, $T_a = -40$ to 85°C)

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

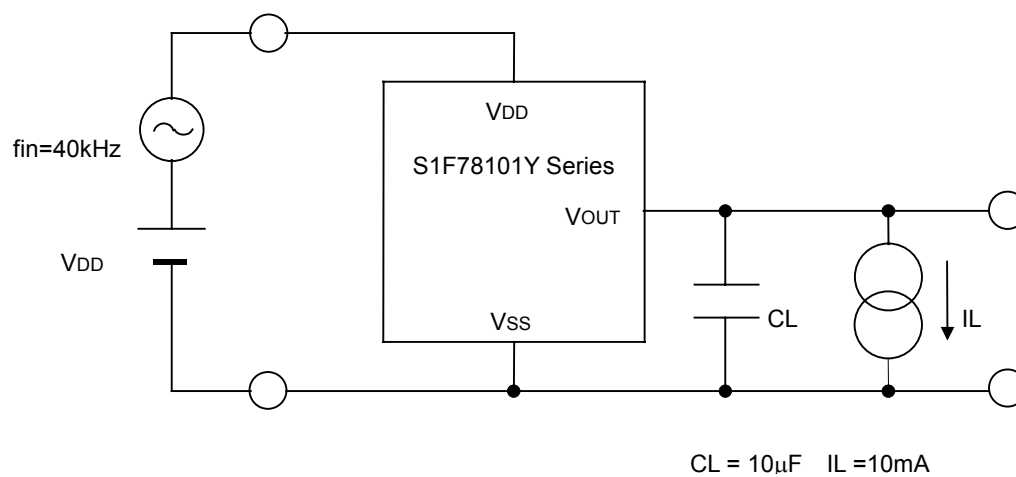
●S1F78101Y3C00

(If not specified, $T_a = -40$ to 85°C)

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

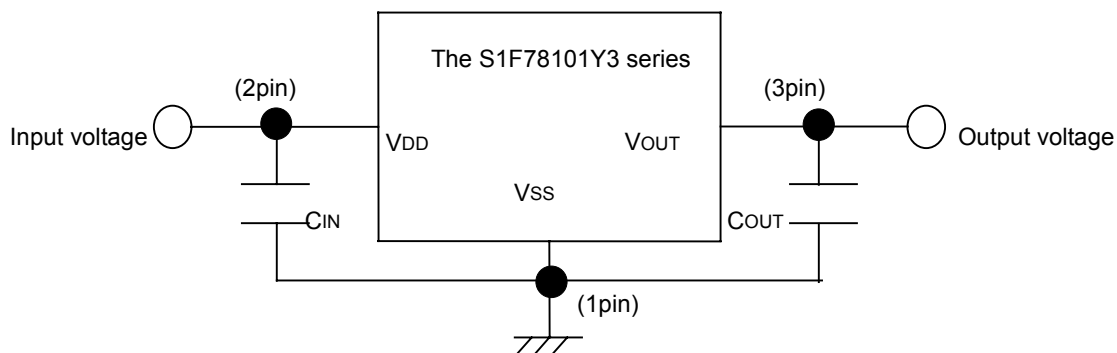
9. ELECTRICAL CHARACTERISTICS

Note: Schematic diagram for measuring power supply rejection ratio characteristics



10. EXTERNAL CONNECTION SAMPLES

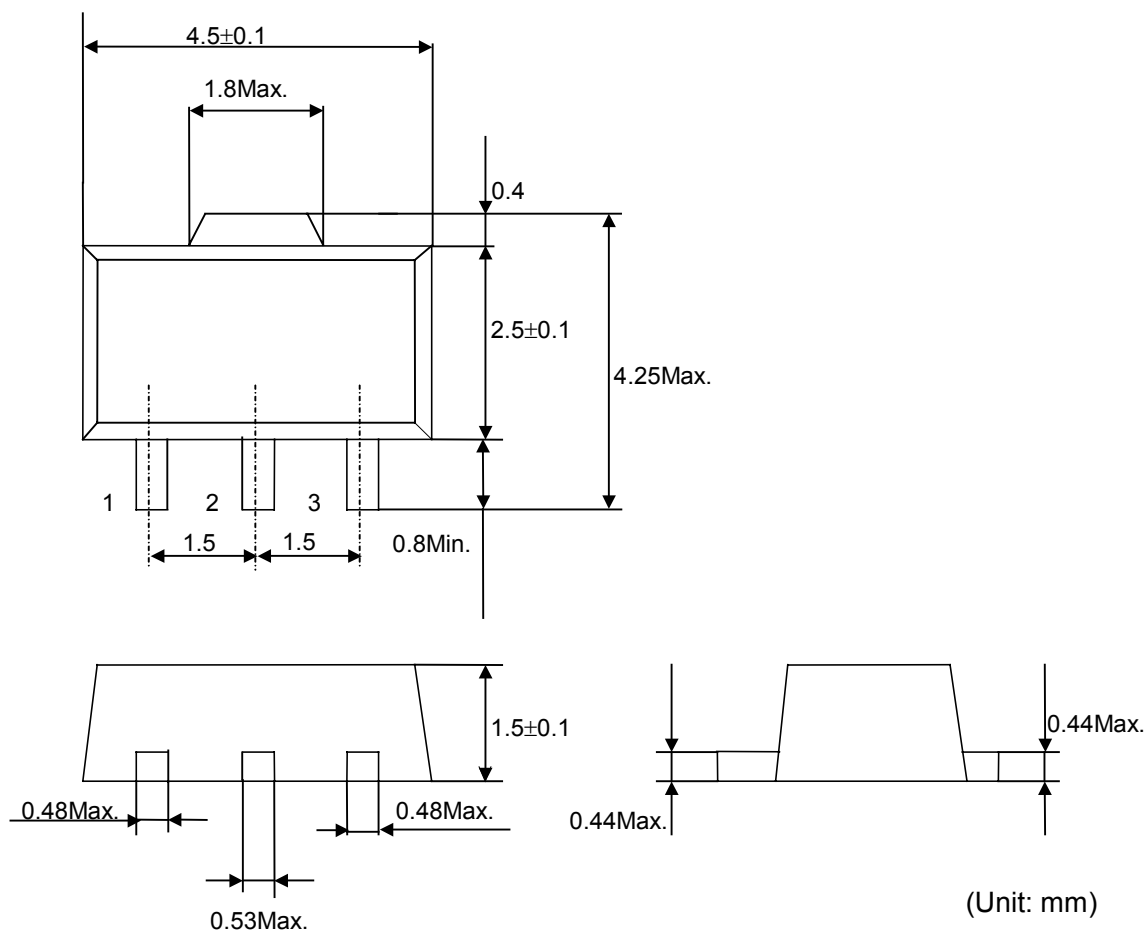
10. EXTERNAL CONNECTION SAMPLES



11. EXTERNAL DIMENSIONS DRAWINGS

Reference

SOT89-3pin



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

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