

<b>SANYO</b>	No.2895A	<b>LA5690D, 5690S</b>
<b>Voltage Regulator Driver with Watchdog Timer</b>		

The LA5690 is a single-chip voltage regulator for microcomputer system monitor use that performs the functions of 5V output voltage control, watchdog timer, and voltage detector. The LA5690 uses a minimum number of parts to provide the basic functions.

**Applications**

- Microcomputer system for car equipment, refrigeration/heating equipment, office automation equipment

**Functions**

- Output voltage 5V<sub>control</sub>
- Watchdog timer
- Power-ON reset function
- Positive/negative logic output for reset

**Features**

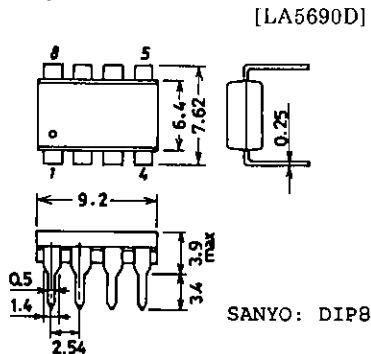
- An external PNP transistor can be used to provide a low-saturation voltage regulator.
- CK input with edge detector
- Variable detection voltage
- Reset output with pull-up resistor of 10kΩ

Maximum Ratings at Ta = 25°C	unit	unit
Control Pin Voltage	V <sub>CONT</sub> max	1sec 60 V
Control Pin Voltage	V <sub>CONT</sub> max	41 V
Control Pin Current	I <sub>CONT</sub> max	*V <sub>CC</sub> ≥ 6V 11 mA
CK Input Voltage	V <sub>CK</sub> max	25 V
Reset Pin Voltage	V <sub>RES</sub> max, V <sub>RES</sub> max	41 V
Allowable Power Dissipation	P <sub>d</sub> max	500 mW
Operating Temperature	T <sub>opr</sub>	-40 to +85 °C
Storage Temperature	T <sub>stg</sub>	-55 to +150 °C

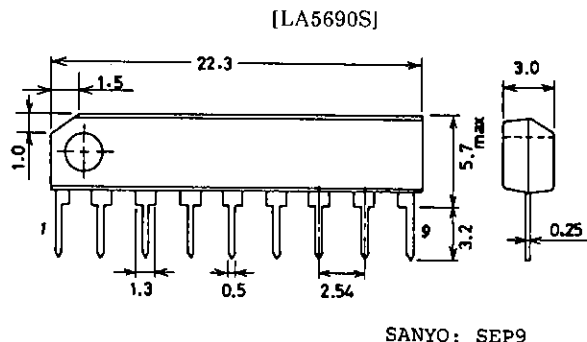
\*: A PNP transistor is connected to the LA5690D, 5690S externally to provide a low-saturation voltage regulator. Therefore, I<sub>CONT</sub> = 100mA will flow, as starting current, in the V<sub>CC</sub> range where the output cannot be regulated.

Operating Conditions at Ta = 25°C	unit
Control Pin Voltage	V <sub>CONT</sub> 6 to 40 V
Control Pin Current	I <sub>CONT</sub> max 10 mA
Reset Output Current	I <sub>RES</sub> max, I <sub>RES</sub> max External R pull-up 8 mA
Reset Detection Voltage	V <sub>S</sub> min 4 V

**Package Dimensions**  
(unit: mm)  
3001B



**Package Dimensions**  
(unit: mm)  
3017B

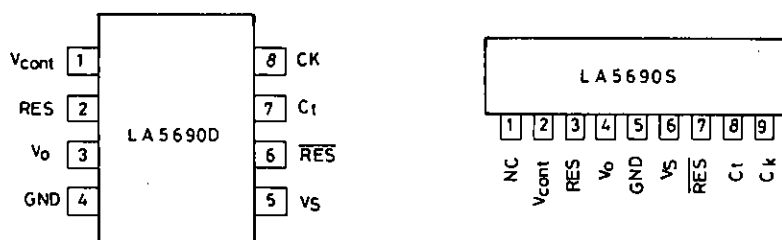


## LA5690D,5690S

**Operating Characteristics at  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 14\text{V}$ ,  $I_O = 50\text{mA}$ , unless otherwise specified**

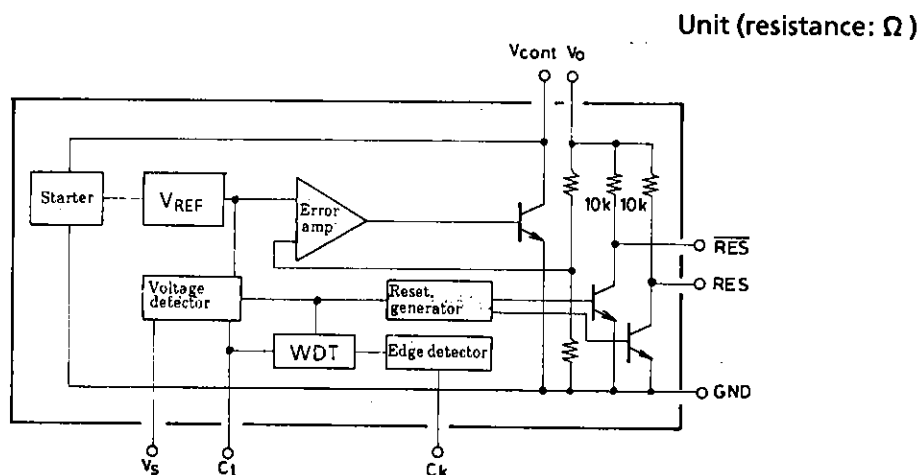
			min	typ	max	unit
Operating Voltage	$V_O$		4.8	5.0	5.2	V
Line Regulation	$\Delta V_{OLN1}$	$9\text{V} \leq V_{CC} \leq 16\text{V}$		2	10	mV
	$\Delta V_{OLN2}$	$6\text{V} \leq V_{CC} \leq 40\text{V}$		4	30	mV
Load Regulation	$\Delta V_{OLD}$	$1\text{mA} \leq I_O \leq 50\text{mA}$		4	30	mV
Current Dissipation	$I_{CC}$	$I_O = 0$		4.9	6.5	mA
Output Noise Voltage	$V_{NO}$	$10\text{Hz} \leq f \leq 100\text{kHz}$ , $V_{CK} = 0$		200		$\mu\text{V}$
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T_a$	$I_O = 5\text{mA}$ , $-40^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$	$\pm 0.2$			mV/ $^\circ\text{C}$
Reference Voltage	$V_{REF}$		1.13	1.18	1.23	V
"H"-Level CK Input Voltage	$V_{IH}$		2			V
"L"-Level CK Input Voltage	$V_{IL}$				0.8	V
"H"-Level CK Input Current	$I_{IH}$	$V_{CK} = 5\text{V}$		0.3	0.7	mA
"L"-Level CK Input Current	$I_{IL}$	$V_{CK} = 0$	-1.0	-0.1		$\mu\text{A}$
"H"-Level Reset Output Voltage	$V_{ORH}/V_{ORH}$		4.8	5.0	5.2	V
"L"-Level Reset Output Voltage	$V_{ORL1}/V_{ORL1}$			40	200	mV
"L"-Level Reset Output Voltage	$V_{ORL2}/V_{ORL2}$	$I_{RES} = I_{RES} = 8\text{mA}$		0.16	0.8	V
CK Input Pulse Width	$t_{CKW}$	$V_{CK} = 5\text{V}$		3		$\mu\text{s}$
Reset Output Delay Time	$t_d$	$C_t = 1\mu\text{F}$	7.5	10	12.5	ms
Watchdog Time	$t_{WD}$	$C_t = 1\mu\text{F}$	3.8	5.0	6.2	ms
Watchdog Reset Time	$t_{WR}$	$C_t = 1\mu\text{F}$	0.1	0.25	0.4	ms
Reset Hysteresis Voltage	$V_{Hys}$	$V_S = 4.5\text{V}$	100	200	300	mV

### Pin Assignment



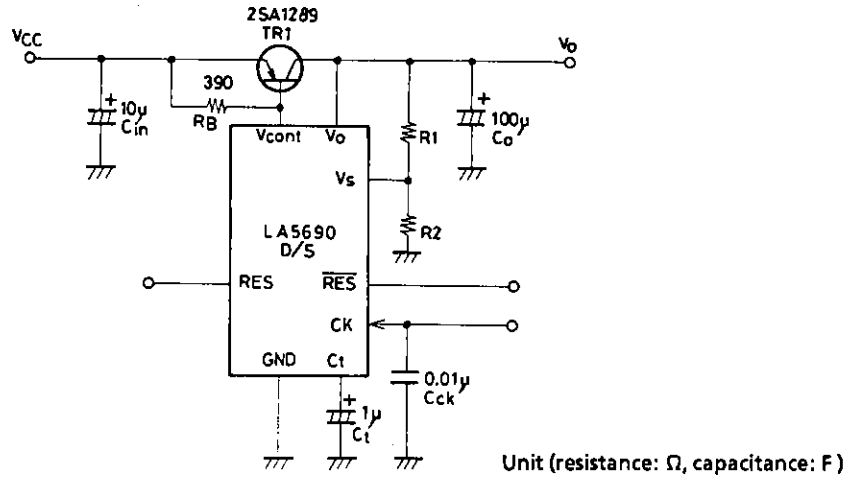
The NC pin, which is left open, must not be used for wiring.

### Equivalent Circuit Block Diagram

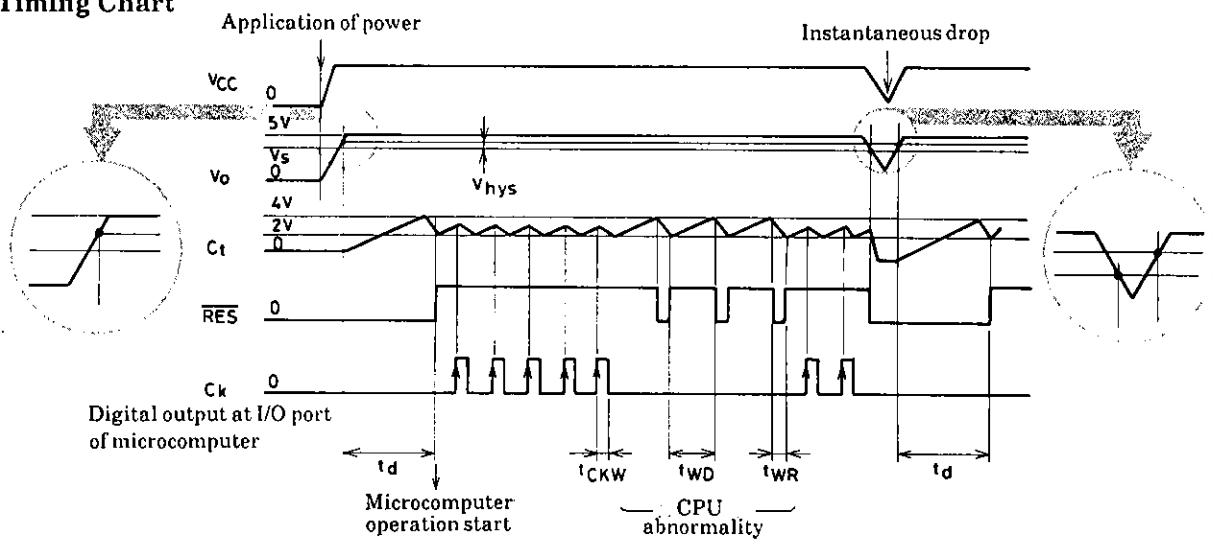


The reset output contains a pull-up resistor of  $10\text{k}\Omega$ .

Test Circuit

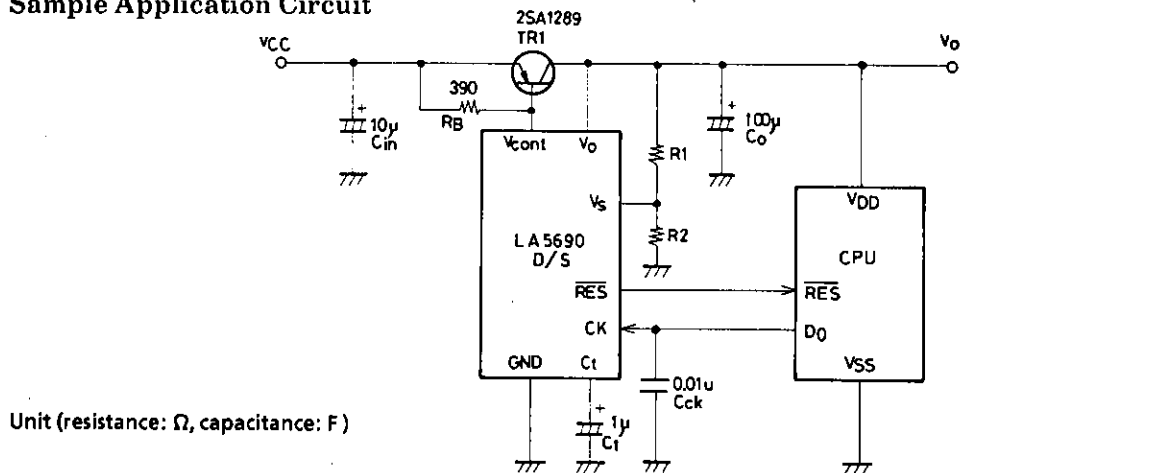


Timing Chart



Note : Edge-triggered at the point indicated by the arrow of C<sub>K</sub> signal.

Sample Application Circuit



TR1 : 2SA1289 (60V/5A, TO-220)

C<sub>t</sub> : Sanyo OS capacitor

$$V_S = V_{REF} \times \left( \frac{R_1}{R_2} + 1 \right)$$

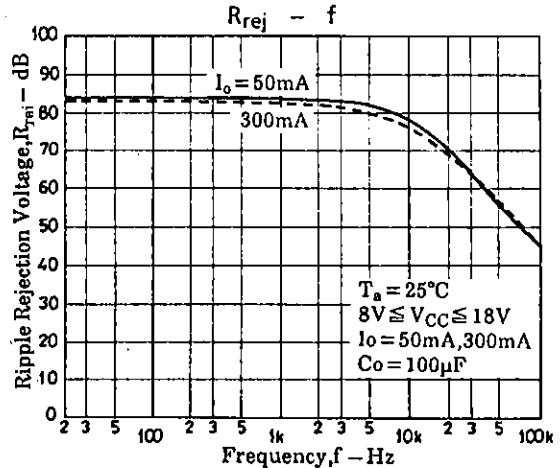
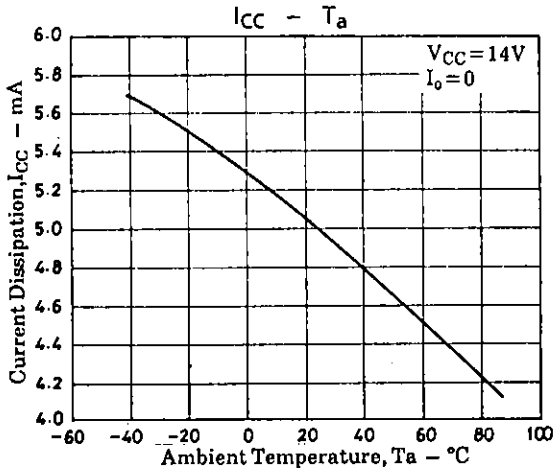
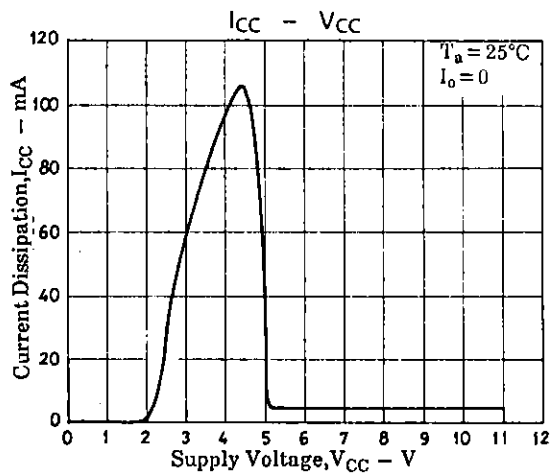
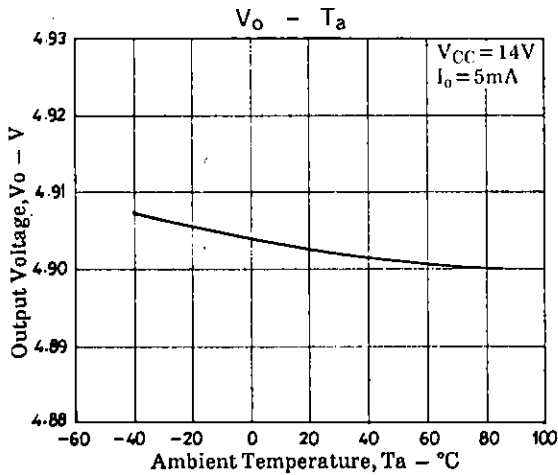
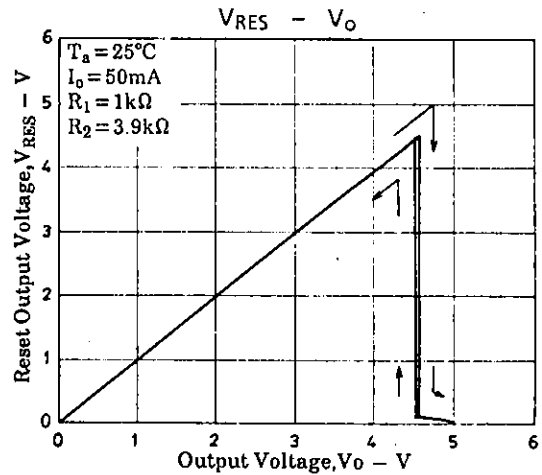
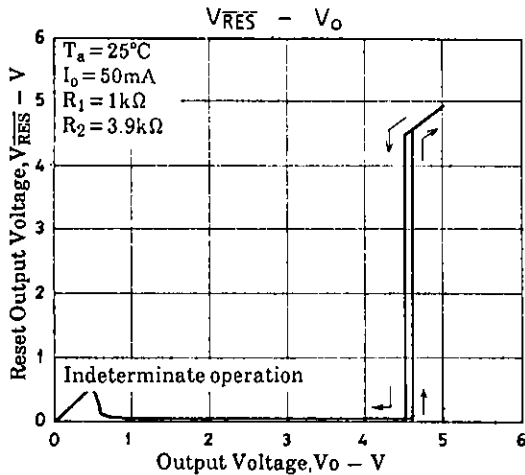
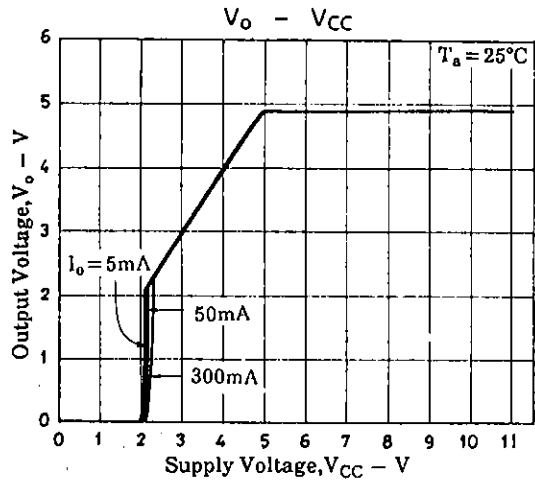
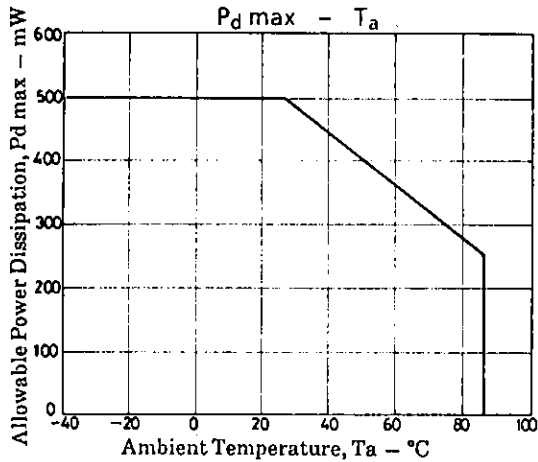
$$V_{REF} \approx 1.18(V)$$

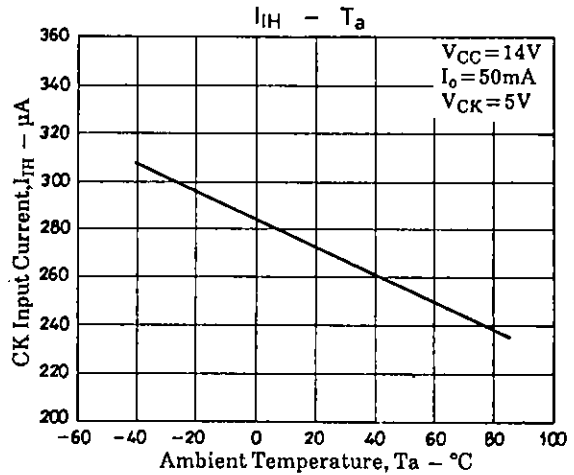
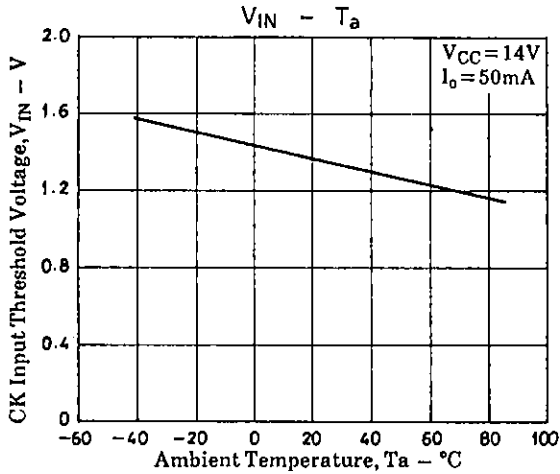
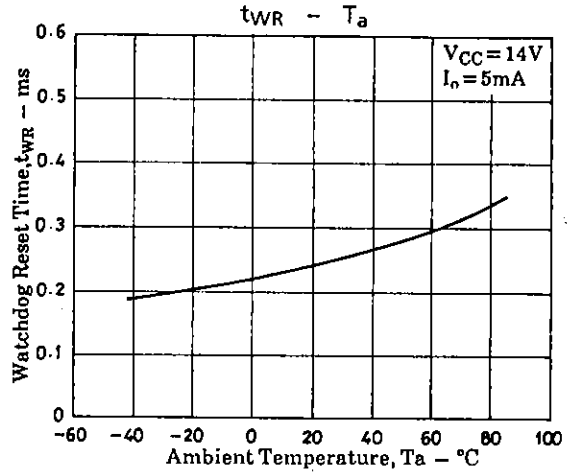
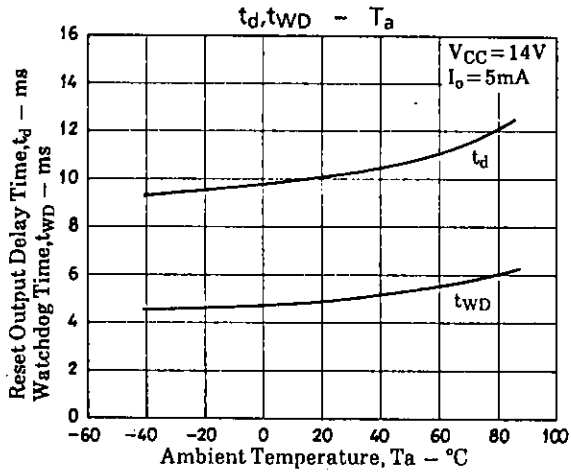
$$t_d = 10 \times C_t (\mu F) [ms]$$

$$t_{WD} = 5 \times C_t (\mu F) [ms]$$

$$t_{WR} = 0.25 \times C_t (\mu F) [ms]$$

- C<sub>t</sub>, C<sub>O</sub> : Capacitors whose value does not vary with temperature very much.
- C<sub>CK</sub> : Must be used to eliminate noise in the reset output.





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