

SANYO	No.2895A	LA5690D, 5690S
Voltage Regulator Driver with Watchdog Timer		

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_{control}
- Watchdog timer
- Power-ON reset function
- Positive/negative logic output for reset

Features

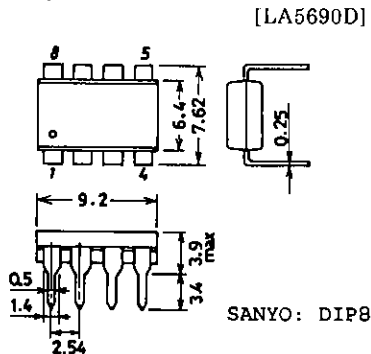
- An external PNP transistor can be used to provide a low-saturation voltage regulator.
- CK input with edge detector
- Variable detection voltage
- Reset output with pull-up resistor of 10kΩ

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

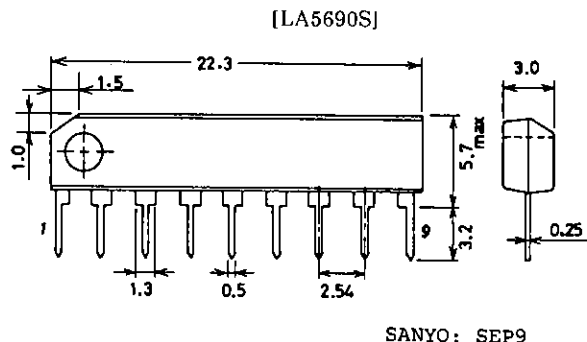
*: A PNP transistor is connected to the LA5690D, 5690S externally to provide a low-saturation voltage regulator. Therefore, I_{CONT} = 100mA will flow, as starting current, in the V_{CC} range where the output cannot be regulated.

Operating Conditions at Ta = 25°C			unit
Control Pin Voltage	V _{CONT}	6 to 40	V
Control Pin Current	I _{CONT} max	10	mA
Reset Output Current	I _{RES} max, I _{RES} max	External R pull-up	8 mA
Reset Detection Voltage	V _S min		4 V

Package Dimensions
(unit: mm)
3001B



Package Dimensions
(unit: mm)
3017B

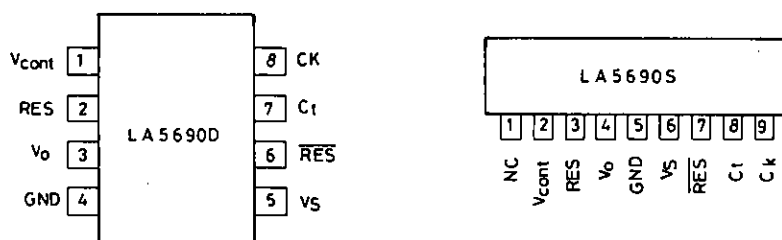


LA5690D,5690S

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

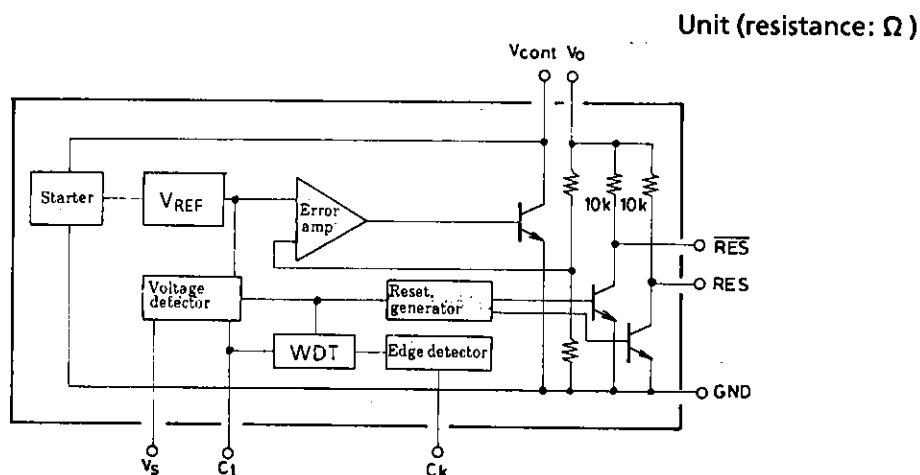
			min	typ	max	unit
Operating Voltage	V_O		4.8	5.0	5.2	V
Line Regulation	ΔV_{OLN1}	$9\text{V} \leq V_{CC} \leq 16\text{V}$		2	10	mV
	ΔV_{OLN2}	$6\text{V} \leq V_{CC} \leq 40\text{V}$		4	30	mV
Load Regulation	ΔV_{OLD}	$1\text{mA} \leq I_O \leq 50\text{mA}$		4	30	mV
Current Dissipation	I_{CC}	$I_O = 0$		4.9	6.5	mA
Output Noise Voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}$, $V_{CK} = 0$		200		μV
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T_a$	$I_O = 5\text{mA}$, $-40^\circ\text{C} \leq T_a \leq +85^\circ\text{C}$	± 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		μA
"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		μs
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



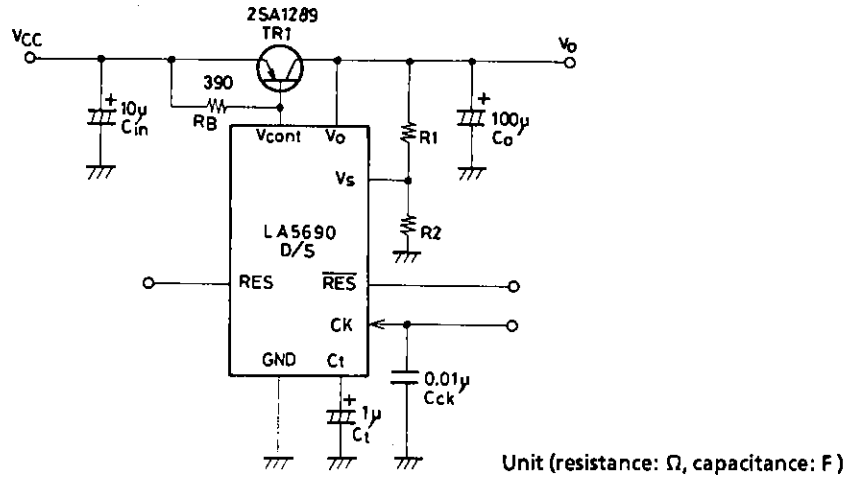
The NC pin, which is left open, must not be used for wiring.

Equivalent Circuit Block Diagram

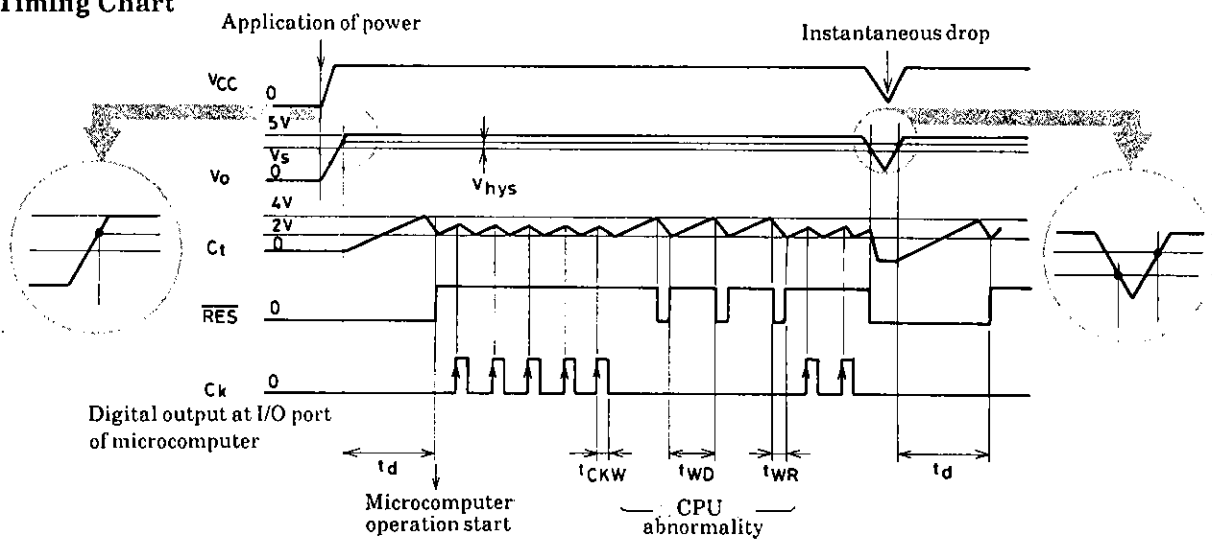


The reset output contains a pull-up resistor of $10\text{k}\Omega$.

Test Circuit

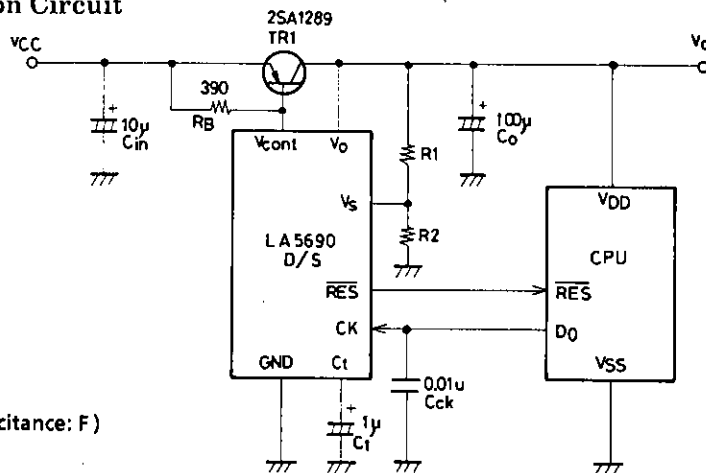


Timing Chart



Note : Edge-triggered at the point indicated by the arrow of C_K signal.

Sample Application Circuit



Unit (resistance: Ω, capacitance: F)

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

C_t : Sanyo OS capacitor

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

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

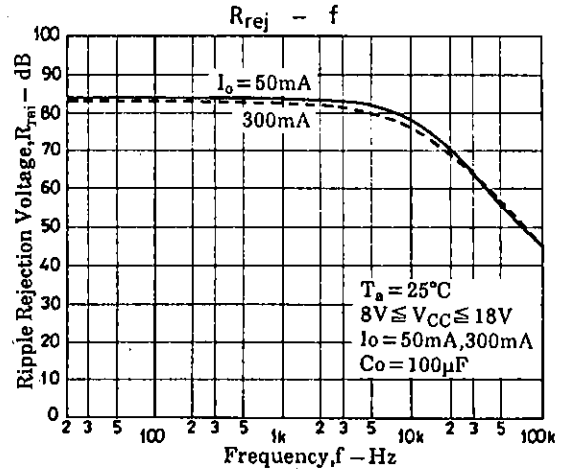
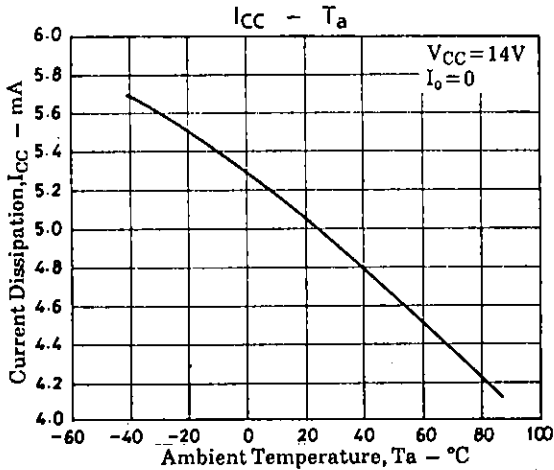
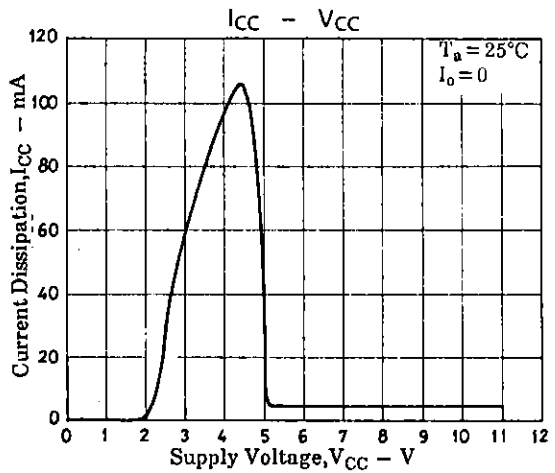
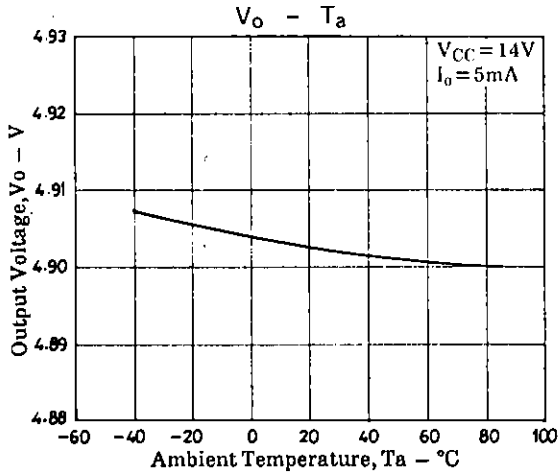
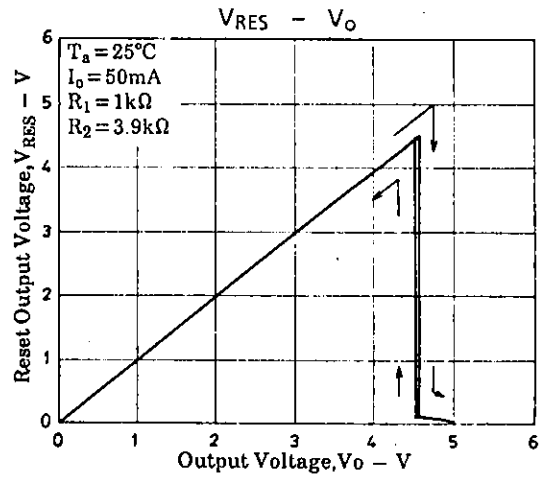
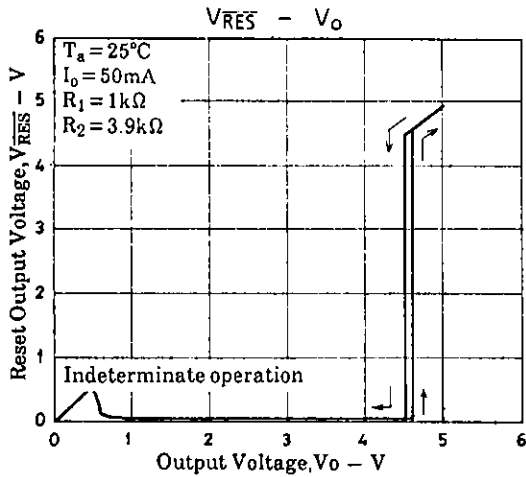
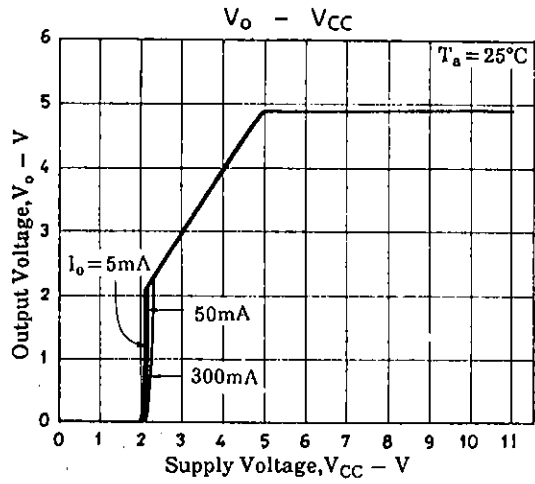
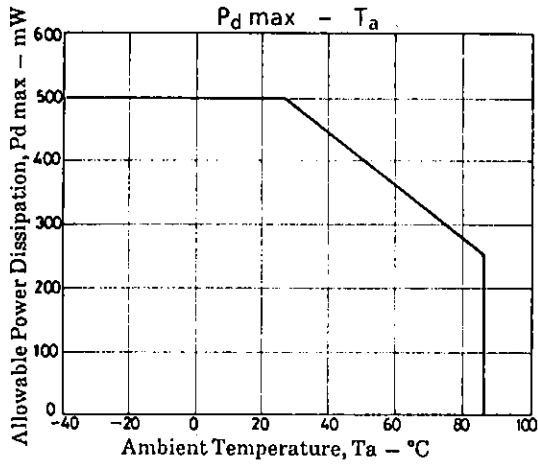
$$t_d = 10 \times C_t (\mu F) [ms]$$

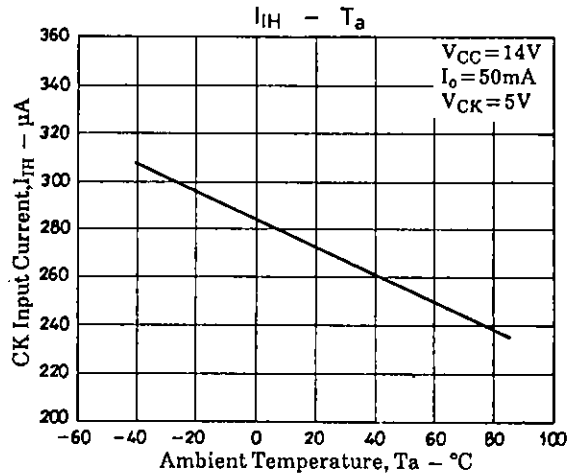
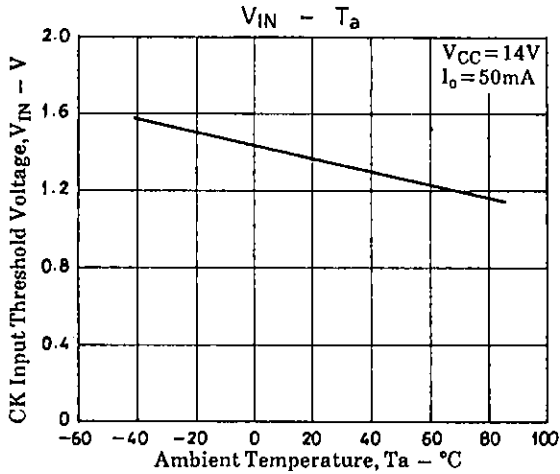
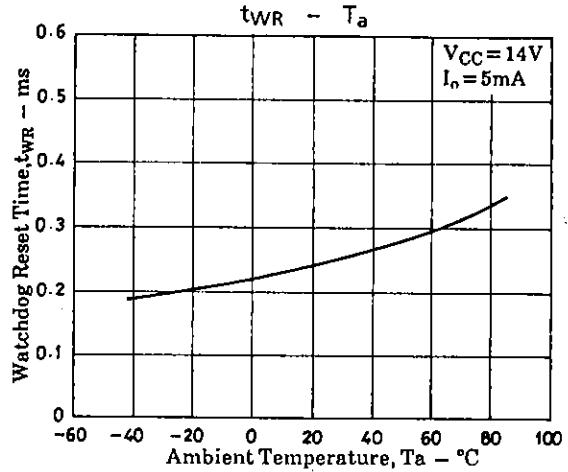
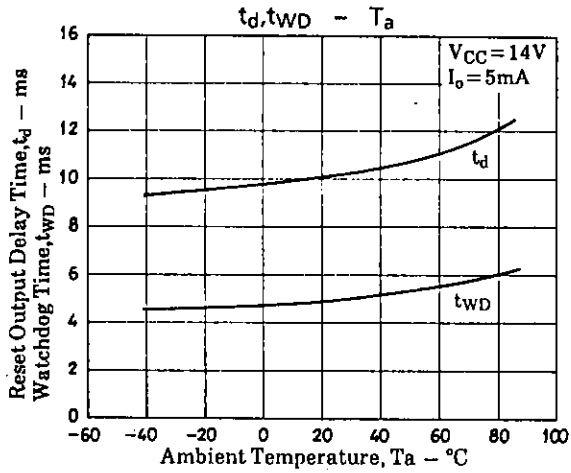
$$t_{WD} = 5 \times C_t (\mu F) [ms]$$

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

·C_t,C_O : Capacitors whose value does not vary with temperature very much.

·C_{CK} : Must be used to eliminate noise in the reset output.





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