



LA5690D, 5690S

Voltage Regulator Driver with Watchdog Timer

Overview

The LA5690 is a single-chip voltage regulator for micro-computer 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.

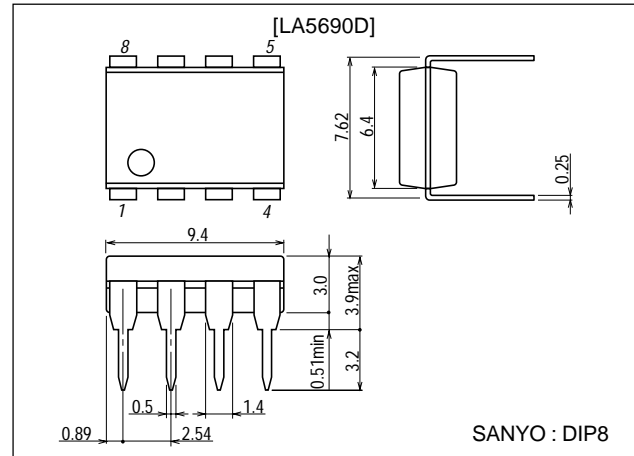
Features

- 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.

Package Dimensions

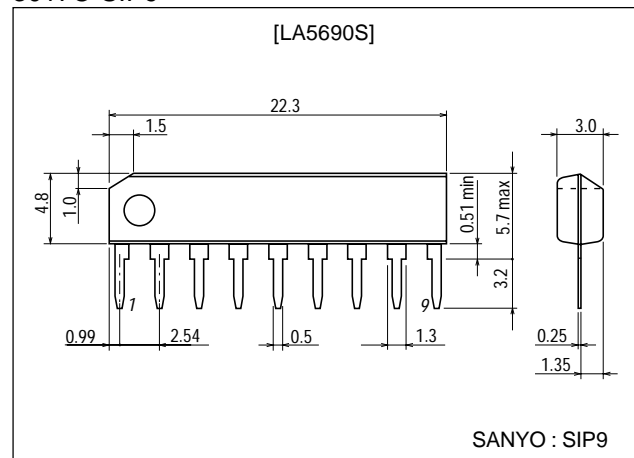
unit:mm

3001B-DIP8



unit:mm

3017C-SIP9



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40500TN (KT)/D219YT/8099YT/9088YT, TS No.2895-1/6

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Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Control pin voltage	V _{CONT} max	1s	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	Pd max		500	mW
Operating temperature	Topr		-40 to +85	°C
Storage temperature	Tstg		-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.

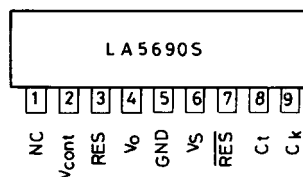
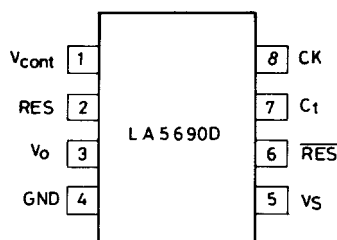
Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	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

Operating Characteristics at Ta = 25°C, V_{CC}=14V, I_O=50mA, unless otherwise specified.

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V _O		4.8	5.0	5.2	V
Line regulation	ΔV _{OLN1}	9V≤V _{CC} ≤16V		2	10	mV
	ΔV _{OLN2}	6V≤V _{CC} ≤40V		4	30	mV
Load regulation	ΔV _{OLD}	1mA≤I _O ≤50mA		4	30	mV
Current drain	I _{CC}	I _O =0		4.9	6.5	mA
Output noise voltage	V _{NO}	10Hz≤f≤100kHz, V _{CK} =0		200		μV
Temperature coefficient of output voltage	ΔV _O /ΔTa	I _O =5mA, -40°C≤Ta≤+85°C		±0.2		mV/°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} =5V		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} =8mA		0.16	0.8	V
CK input pulse width	t _{CKW}	V _{CK} =5V	3			μs
Reset output delay time	t _d	C _t =1μF	7.5	10	12.5	ms
Watchdog time	t _{WD}	C _t =1μF	3.8	5.0	6.2	ms
Watchdog reset time	t _{WR}	C _t =1μF	0.1	0.25	0.4	ms
Reset hysteresis voltage	V _{hys}	V _S =4.5V	100	200	300	mV

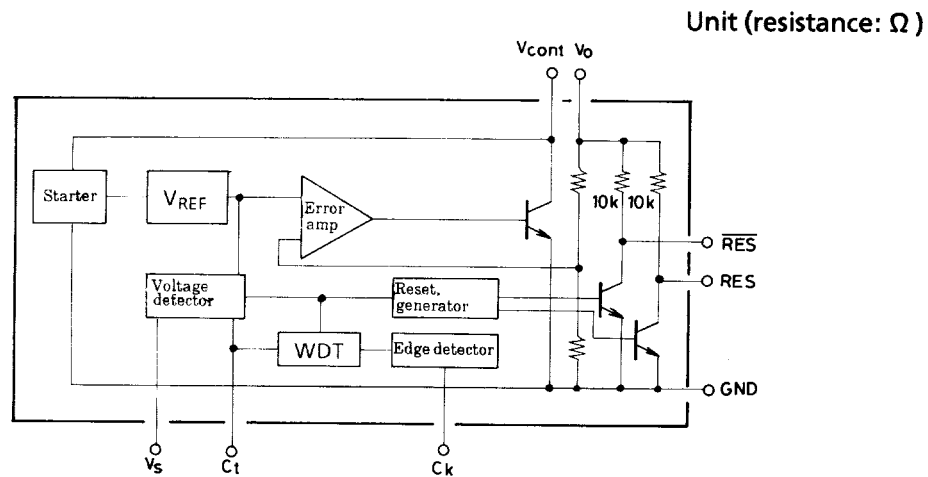
Pin Assignments



Top view

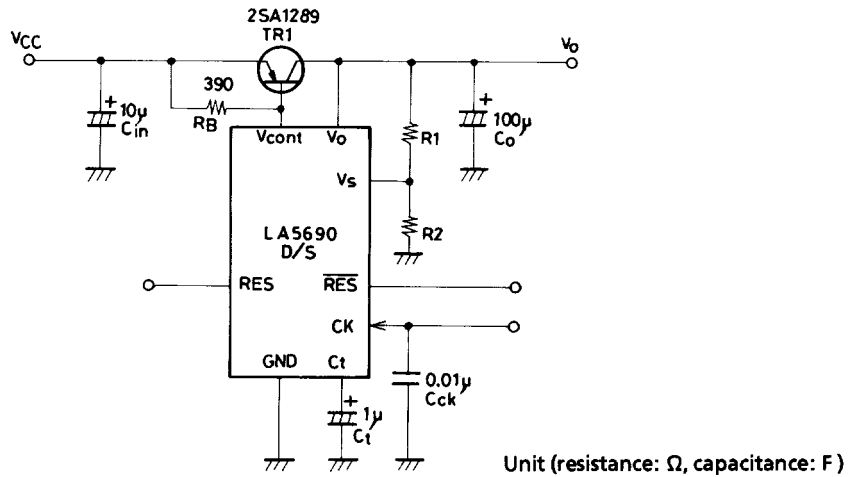
The NC pin, which is left open, must not be used for wiring.

Equivalent Circuit Block Diagram

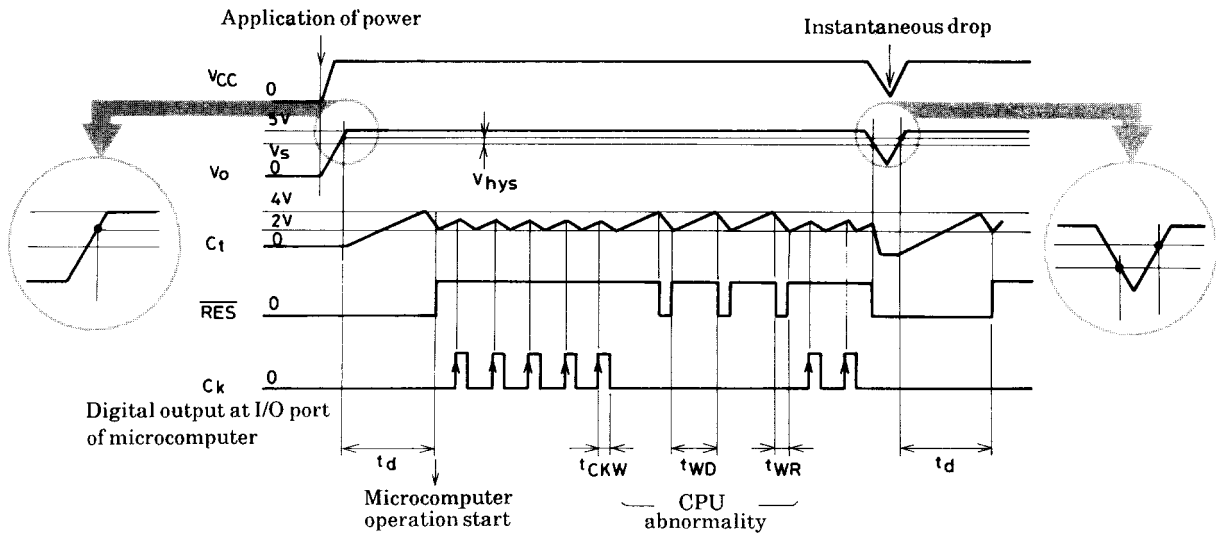


The reset output contains a pull-up resistor of 10kΩ.

Test Circuit



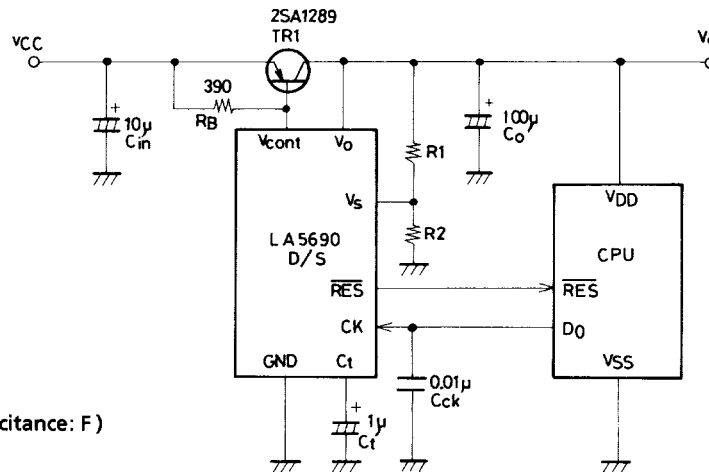
Timing Chart



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

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Sample Application Circuit



Unit (resistance: Ω, capacitance: F)

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

Ct : Sanyo OS capacitor

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

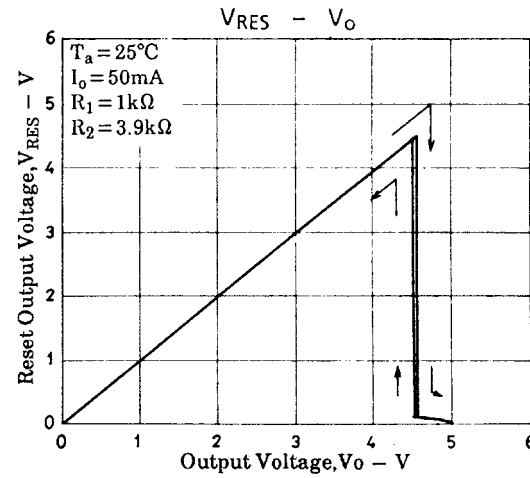
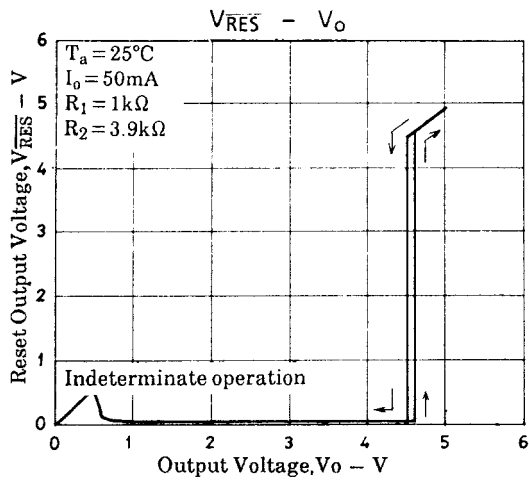
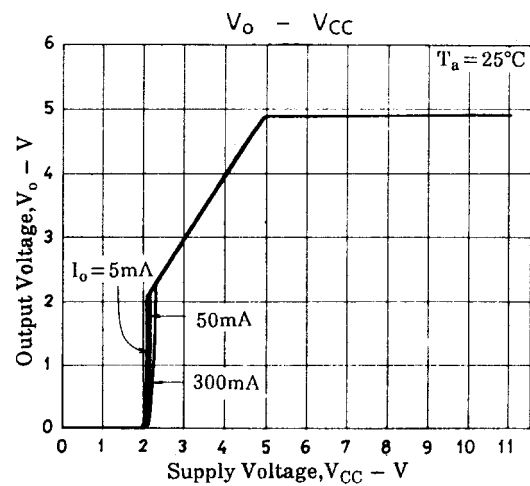
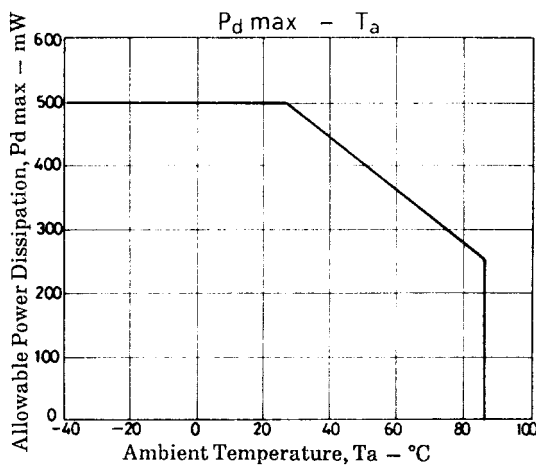
$$V_{REF} \approx 1.18(V)$$

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

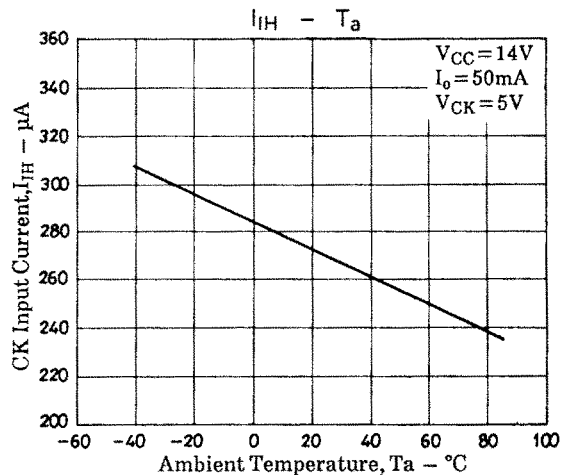
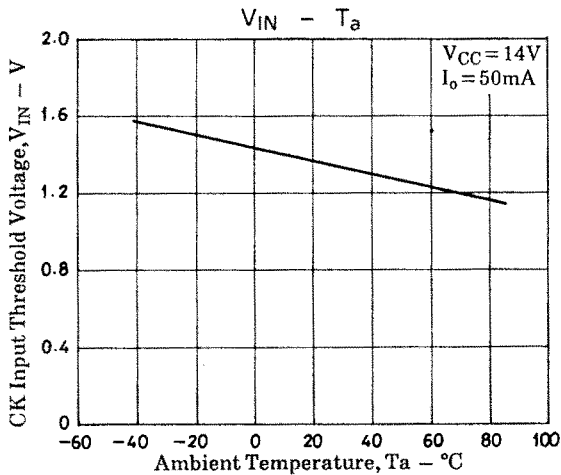
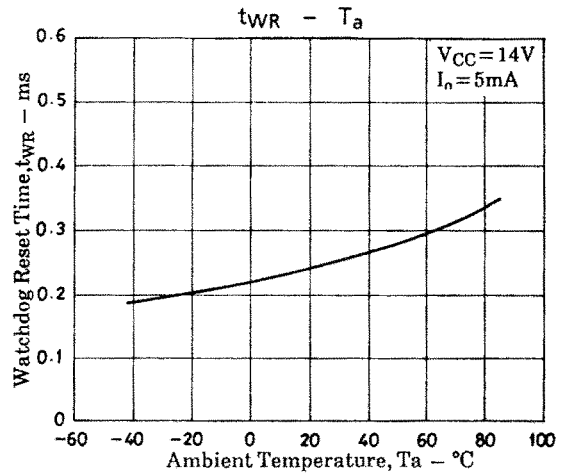
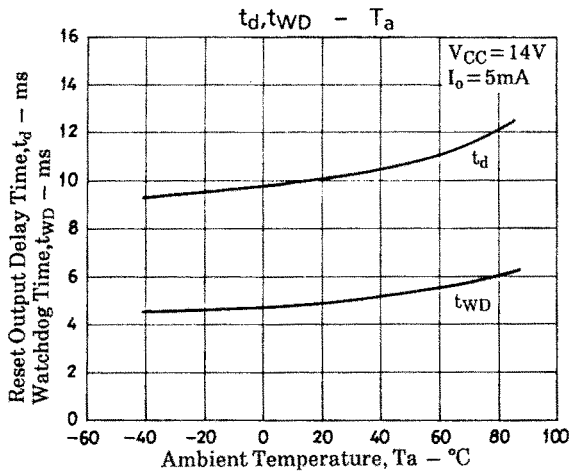
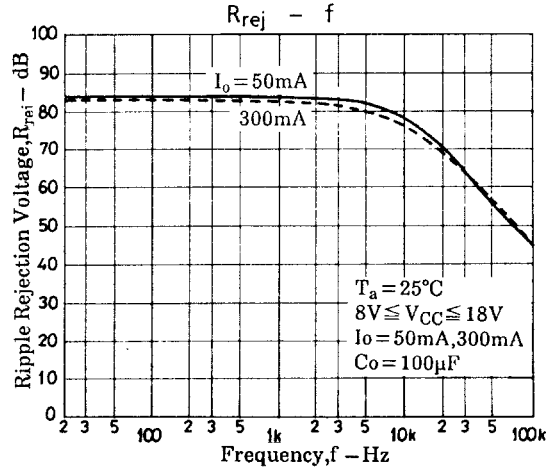
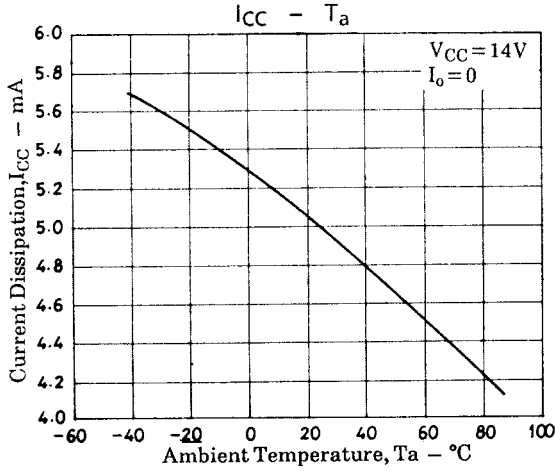
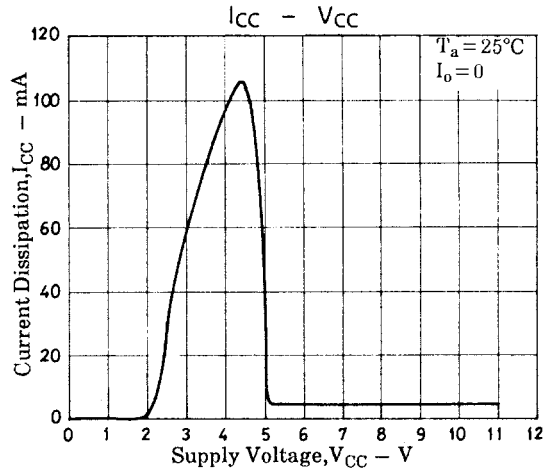
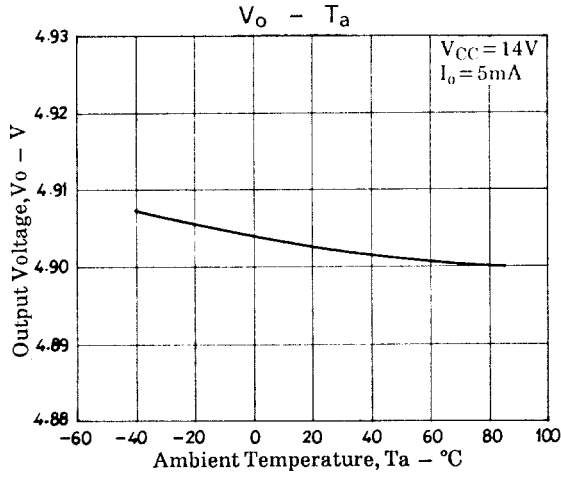
$$t_{WD} = 5 \times C_t (\mu F) [ms]$$

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

- Ct, Co : Capacitors whose value does not vary with temperature very much.
- CCK : Must be used to eliminate noise in the reset output.



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